Technical Memorandum No. 6: Environmental Screening

November 2007

Washington State Department of Transportation

LOCHNER

US 2
Route Development Plan

Environmental Screening
Technical Memorandum

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WSDOT
Environmental Services Office

Washington State
Department of Transportation

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1 Introduction

United States Route 2 (US 2) is a 323-mile highway running east-west across the state of Washington. The highway is one of only two routes through the Cascade Mountains that connect eastern and western Washington year-round.

WSDOT conducted an environmental screening to assess and prioritize the potential impacts of 58 proposed roadway improvement and safety projects along the US 2. This screening is not sufficient for environmental regulatory approvals.

The 58 proposed projects are divided into two types – corridor projects and spot projects. Corridor projects are linear roadway improvement projects that may be necessary in broad-scale areas along the corridor such as lane widening projects, shoulder widening projects, and bridge repairs or replacements. Spot projects include things such as intersection improvements. **Exhibit 3** lists the 58 proposed projects by category.

There are some projects that either have an undefined project footprint at this time, or will occur in the existing highway. Therefore, no individual project effects were calculated for these projects in this screening.

Study Area

The 47-mile study area begins at Bickford Avenue in the City of Snohomish and ends past the eastern limits of the Town of Skykomish at the Old Cascade Highway. Because the project study area is long and diverse, it was divided into four segments.

The segments are split up by mile post (MP) west to east. Each segment has similar characteristics and transportation needs. **Exhibit 1** illustrates the locations of these four segments.

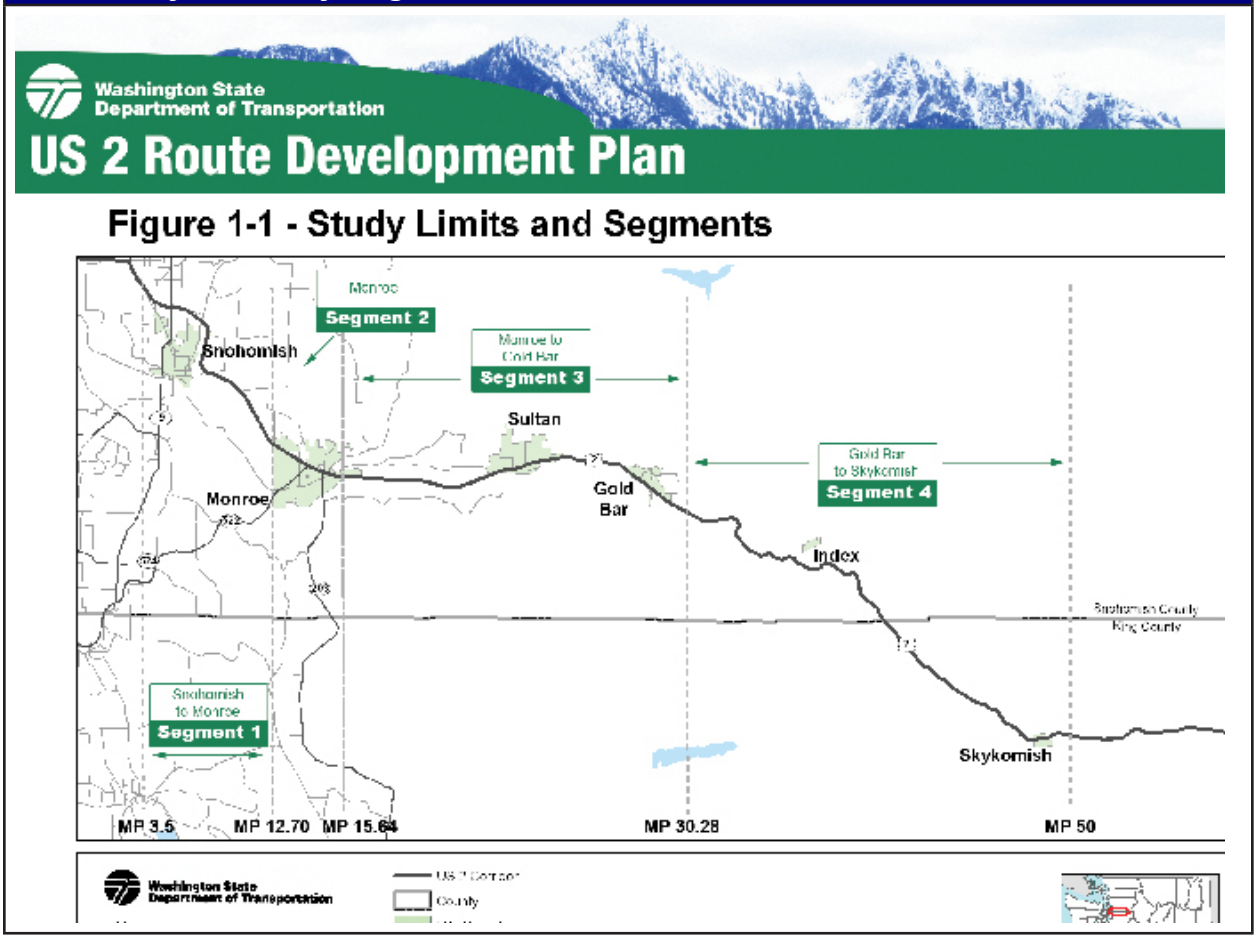
The following discussion summarizes the location and characteristics of each segment:

- **Segment 1** (Snohomish to West Monroe, MP 3.50-12.70): This relatively flat segment of US 2 begins near

Snohomish and continues through rural land, wetlands, and farmlands.

- **Segment 2** (City of Monroe, MP 12.70-15.64): Segment 2 is lined by urban development with multiple traffic signals at city intersections. These traffic signals, along with driveways that lead to houses and businesses, impede traffic flow. SR 522 intersects US 2 in this segment, and is a major commuting route to the Seattle urban area.
- **Segment 3** (East of Monroe to East of Gold Bar, MP 15.64-30.28): This segment is less developed, and is lined by forest in many locations. It includes the smaller cities of Sultan and Gold Bar. Homes and businesses along this segment of US 2 are often built directly adjacent to the roadway.
- **Segment 4** (East of Gold Bar to Old Cascade Highway, past the Skykomish eastern town limits, MP 30.28-50.00): The final segment of the US 2 study area climbs into the Cascade Mountains. Area communities (Index, Baring, and Skykomish) are not directly adjacent to the corridor.

Exhibit 1
US 2 Study Limits by Segment



This report will discuss the potential projects' effects on a variety of environmental issues. Those issues are divided into natural resources, natural hazards, and human environment, as shown in **Exhibit 2,** which follows. The environmental issues discussed are typical issues that would be included in a State Environmental Policy Act (SEPA) or National Environmental Policy Act (NEPA) review when the projects are officially proposed.

Each environmental issue is discussed separately in its own section, which includes a discussion of why the issue is important to the US 2 corridor, and the methodology used to analyze the projects' effects on existing resources and conditions. The specific analysis of the issues relates specifically to SEPA, NEPA, or environmental permitting requirements that will need to be elaborated on once the projects are officially proposed and the environmental review process is initiated.

Exhibit 2
Environmental Issue Categories

Category	Environmental Issue
Natural Resources	Wetlands
	Water Quality
	Streams
	Fish & Aquatic Resources
	Wildlife
Natural Hazards	Floodplains
	Steep Slopes
	Liquefaction
Human Environment	Environmental Justice
	Parks and Recreation Resources
	Cultural and Historic Resources
	Noise Quality
	Air Quality
	Land Use
	Public Services

Exhibit 3
Proposed US 2 Projects

No.	Milepost	Corridor Project	Spot Project	No Effects Calculated	Type	Description
Segment 1						
36	3.85 Bickford Ave.		x		Interchange Improvements	Add westbound overcrossing and modify eastbound on-ramp.
37	5.04 SR 9		x		Interchange Improvements	Add eastbound lane, new ramp connectors, add traffic signals and illumination.
49	8.51 88th St		x		Interchange Improvements	Add eastbound lane, new ramp connectors and illumination.
4	12.46		x		Intersection Improvements	Dairy farm channelization and safety Improvements.
50	10.08 Westwick Rd.		x		Intersection Improvements	Re-align Westwick Road, add lanes, and consolidate driveways.
51	10.55 Roosevelt Rd.		x		Intersection Improvements	Re-align Roosevelt Rd., add one lane in both directions, and install interim traffic signal.
3	3.5 –12.7			x	ITS	ITS Traveler Information (CCTV, VMS).
1	3.5 -12.7			x	Rumble Strips	Install median rumble strip.
2	3.5 –12.7	x			Shoulders and Rumble Strips	Widen should, install shoulder rumble strip, miscellaneous roadside safety improvements.
48	3.5 – 12.7	x			Widen to four lanes	Widen to four lanes (including bridge modifications), install median barrier.

Exhibit 3
Proposed US 2 Projects

No.	Milepost	Corridor Project	Spot Project	No Effects Calculated	Type	Description
Segment 2						
54	15.37		x		Bridge	Repair and widen Woods Creek Bridge.
5	14.57 Kelsey St		x		Intersection Improvements	Add double left-turn lanes.
6	14.92 SR 203		x		Intersection Improvements	Add double left-turn lanes.
7	15.15 Ann St./Woods Cr.		x		Intersection Improvements	Add double left-turn lanes.
52	12.7 – 15.6	x			New Alignment	Monroe Bypass – Stage 1.
53	12.7 – 15.6	x			New Alignment	Monroe Bypass – Stage 2.
38	12.7 – 15.6	x			Pedestrian	Sidewalk improvements.
56	12.7 - 13.87	x			Widen to four lanes	Add one lane in each direction.
55	12.7 – 14.57	x			Widen to Three Lanes	Add westbound lane, Kelsey through 179th Ave.
Segment 3						
15	22.24 – 22.93	x			Intersection Improvements	Additional westbound lane and restrict left-turn access.
19	28.59 – 28.9	x			Intersection Improvements	Extend two way left-turn lane to existing left-turn lane at 17th Street.
9	17.91 Sofie Rd.		x		Intersection Improvements	Add westbound left-turn lane and eastbound right-turn lane.
10	18.3 153rd Pl. SE		x		Intersection Improvements	Add eastbound left-turn lane.
11	18.98 Nursery		x		Intersection Improvements	Construct westbound left-turn and eastbound right-turn lanes.
12	20.10 – 20.15 Fern Bluff		x		Intersection Improvements	Add left-turn and right-turn lanes.
16	24.73 Sultan - Startup Rd.		x		Intersection Improvements	Install left-turn lane, widen shoulder or prohibit left-turns.
17	27.0 Fish Hatchery Rd.		x		Intersection Improvements	Add eastbound left-turn lane.
18	27.45 Nugget Rd.		x		Intersection Improvements	Install left-turn lane.
21	30.04 Reiter Rd.		x		Intersection Improvements	Intersection improvement, add westbound right-turn lane.
13	20.7 – 21.39	x			Passing Lane	Install westbound passing lane.
20	29.48 Pickle Farm Rd.		x		Roundabout	Roundabout.
8	15.6 – 30.3			x	Rumble Strips	Install median rumble strip.
39	Rural Area Only	x			Shoulders and Rumble Strips	Widen shoulders, install shoulder rumble strip, miscellaneous roadside safety improvements.
14	20.45			x	Spot Safety	Eliminate wide turn out area eastbound due to site distance problem.
42	27.51 – 28.72	x			Widen to four lanes	Gold Bar, add eastbound lane.
57	15.6 – 30.1	x			Widen to four lanes	Widen to four lanes.
58	21.42 – 24.44	x			Widen to four lanes	Sultan, add eastbound lane, four roundabouts.
40	21.42 – 24.44	x			Widen to three lanes	Add westbound lane, median, driveway consolidation, u-turn and right-turn restriction at Main.
41	27.51 – 28.72	x			Widen to three lanes	Gold Bar, add westbound lane, median, and 2 roundabouts.

Exhibit 3

Proposed US 2 Projects

No.	Milepost	Corridor Project	Spot Project	No Effects Calculated	Type	Description
Segment 4						
26	35.1 – 35.62	x			Bridge	Realign & widen bridge approaches.
44	30.3 – 50.0	x			Bridge	Widen or replace 26 bridges.
24	31.26 – 31.73	x			Intersection Improvements	Add left-turn lanes for two gravel pit driveways.
35	49.8 – 50.2	x			Intersection Improvements	Add two way left-turn lane.
23	30.6 Green Water		x		Intersection Improvements	
31	45.9 Money Creek		x		Intersection Improvements	Add westbound left-turn lane.
33	49.51 Beckler Rd.		x		Intersection Improvements	Add westbound left-turn lane.
34	49.98 Old Cascade Hwy		x		Intersection Improvements	Add westbound left-turn lane.
45	35.62 Index Galena Rd.		x		Intersection Improvements	Add westbound right-turn lane, re-channelization.
29	35.95 – 36.4	x			Passing Lane	Construct eastbound truck climbing lane.
46	41.0 – 43.0	x			Passing Lane	Widen to 4 lanes to allow passing.
32	48.7 - 49.5	x			Pedestrian	Pedestrian improvement per school district.
47	48.71 5th St. Skykomish		x		Roundabout	Roundabout.
22	30.3 – 50.0			x	Rumble Strips	Install median rumble strip.
28	35.35 – 35.62			x	Rumble Strips	Eliminate driveway access, install edge line rumble strip.
43	30.3 – 50.0	x			Shoulders and Rumble Strips	Widen shoulders, install shoulder rumble strip, miscellaneous roadside safety improvements.
27	35.45 – 35.55			x	Signage	Install chevron warning signs on westbound horizontal curve between Index Rd and bridge.
25	32.23 – 32.96	x			Spot Safety	Re-mark passing lanes.
30	38.5		x		Spot Safety	Re-slope shoulder and improve drainage due to snow and ice hazard.

Analysis Area

The analysis area is the physical area being examined for a particular environmental issue. This process is used to determine the effects that the proposed projects may have on environmental resources or conditions. The analysis areas are likely to become that proposed project's footprint (e.g.; an additional travel lane) and development of:

- fill,
- slopes,
- retaining walls,
- noise walls,
- signs, and
- other utilities or transportation related facilities.

WSDOT has not completed a design for stormwater facilities at this time, and the environmental effects of the required stormwater systems could lie outside the currently defined areas of analysis.

There are two different sizes of analysis areas for this environmental screening: standard analysis areas, and extended analysis areas.

The standard analysis areas are used to reflect only the area directly affected proposed project – essentially, the area of the environment that would be physically disturbed, which was assumed to include the existing highway footprint plus 50 feet on either side of that portion of the highway.

The extended analysis areas are used to determine potential project effects on environmental elements, including things such as noise, visual disturbances, and changes in stormwater quantity and quality, in addition to physical disturbance. The extended analysis area was defined to include the existing highway footprint in the area of the proposed project plus 300 feet on either side of that portion of the highway.

Exhibit 4 summarizes the environmental elements WSDOT investigated, and whether potential project effects for each element were calculated using the standard or extended analysis area.

Exhibit 4
Type of Analysis Used for Environmental Elements

Category	Environmental Issue	Standard Analysis Area (50 feet)	Extended Analysis Area (300 feet)
Natural Resources	Wetlands		x
	Water Quality		x
	Streams		x
	Fish & Aquatic Resources		x
	Wildlife		x
Natural Hazards	Floodplains	x	
	Steep Slopes	x	
	Liquefaction	x	
Human Environment	Environmental Justice	NA	NA
	Parks and Recreation Resources	x	
	Cultural and Historic Resources	x	
	Noise Quality	x	
	Air Quality	NA	NA
	Land Use	x	
	Public Services	x	

The environmental justice analysis was based on the use of census tracts rather than the standard or extended analysis areas. For this, WSDOT selected census tracts that abutted the highway, including city center census tracts directly adjacent to US 2.

For the purposes of this report, WSDOT analyzed air quality on a qualitative basis. At this time there is insufficient information about the specific projects to be able to conduct air studies and generate quantitative data. Instead, WSDOT looked at whether the projects were in non-attainment zones or maintenance areas.

Screening Methods

WSDOT completed this environmental screening using existing data sources and analyzed that data using Geographic Information Systems (GIS). The GIS analysis used ModelBuilder software, which is a published method for designing, conducting, and recording complicated GIS analyses. The ModelBuilder analysis improves on the standard GIS analysis in five important ways:

1. It is a published, well-known, recognized, peer-reviewed process;
2. It generates a detailed, standardized record (metadata) of the GIS processing;
3. It is easily repeatable;
4. It is easy to modify; and
5. It creates an intellectual framework that facilitates standard analysis across resource types.

In this case, a model is a set of spatial processes that converts input data into an output map using a specific function such as a buffer or an overlay. The program can build large models by connecting several processes together.[1]

In order to create the base map for the ModelBuilder process, WSDOT had to determine the current roadway footprint and estimate the current edge of pavement. WSDOT estimated the location of the project footprint and the edge of pavement by using an aerial photograph, and centering the average road width of US 2 along the centerline of the highway. WSDOT checked this estimation of the road footprint and the pavement's edge against landmarks on aerial photographs and other GIS layers.

This assessment was based on existing conditions, which WSDOT derived from numerous sources including local, state, and federal databases and geographic information systems (GIS) maps. No site-specific field data was used for this analysis. Due to this high-level screening and nature of the data used, WSDOT needed to make numerous assumptions in order to conduct this environmental screening. Those assumptions are documented in the methodology sections in each environmental issue subsection.

WSDOT also made some assumptions to determine the project footprint for standard area projects as well as extended area projects, as described above. In addition, the spot projects footprints were estimated by looking at aerial photographs of the existing intersections and estimating the size of the footprint, then adding either the standard or extended analysis area distance.

1 http://www.arcgeo.sk/iniznica/doc/modelbuilder.pdf

2 Wetlands[2]

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on wetlands and buffers. Wetlands contribute to water quality and flow regulation for the rivers, which support large runs of fish, including salmon and trout. Any proposed project that may affect wetlands or their buffers must adhere to federal, state, and local regulations regarding wetland effects and water quality effects.

Methods

WSDOT used the extended analysis area for studying wetlands. This area included the existing roadway and intersections plus 300 feet on each side of the pavement. WSDOT overlaid the analysis area on wetlands data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for the wetlands and wetland buffers. Most of those wetlands within the US 2 corridor are likely to be Type II and III. Therefore, WSDOT used a 100-foot buffer and the extended area of analysis of 300 feet. This represents the range of local jurisdiction buffer distances for Class II and III wetlands, from 25 feet to 300 feet.

The GIS layers for wetlands consisted of data from National Wetland Inventory (NWI), King County, and Snohomish County. The 100-foot buffers were added to each wetland identified on these data layers.

Result Summary

The results of the corridor-wide analysis are summarized in the following table. The location of the wetlands and buffers are depicted on screening maps, which are provided in **Appendix A**.

2 Impacts described on pages 16 - 20 may not encompass all potential wetland impacts resulting from the proposed projects.

Exhibit 5

Corridor Project Effects on Wetlands and Buffers (Acres)

No.	Milepost	Type of Project	Wetland Effects (acres)	100 foot Wetland Buffer Effects (acres)
Segment 1				
2	3.5 –12.7	SH	43	50
48	3.5 – 12.7	W	43	50
			85	100
Segment 2				
38	12.7 – 15.6	PED	28	28
52	12.7 – 15.6	A	0.0	1
53	12.7 – 15.6	A	1	3
55	12.7 – 14.57	W	25	21
56	12.7 - 13.87	W	24	16
			78	68
Segment 3				
13	20.7 – 21.39	PASS	0.3	2
15	22.24 – 22.93	IC	0.5	2
19	28.59 – 28.9	IC	0.0	0.0
40	21.42 – 24.44	W	14	21
41	27.51 – 28.72	W	0.0	0.1
42	27.51 – 28.72	W	0.0	0.1
57	15.6 – 30.1	W	83	94
58	21.42 – 24.44	W	14	21
			112	139
Segment 4				
24	31.26 – 31.73	IC	0.0	0.0
25	32.23 – 32.96	S	0.0	0.0
26	35.1 – 35.62	B	0.0	0.5
29	35.95 – 36.4	PASS	0.0	0.0
32	48.7 - 49.5	PED	0.0	0.0
35	49.8 – 50.2	IC	0.0	0.0
43	30.3 – 50.0	SH	5	10
44	30.3 – 50.0	B	5	10
46	41.0 – 43.0	PASS	3	5
			14	25

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
S *Safety project*
SH *Shoulder improvements*
W *Widen highway*
A *New alignment of highway*
PED *Pedestrian improvement*
PASS *Passing Lane*

These results of the corridor project analysis show that most of the effects on wetlands and wetland buffers occur in Segment 3. The projects with the most effects on wetlands and wetland buffers appear to be Projects 57 in Segment 3 and Projects 2 and 48 in Segment 1.

The following table summarizes the spot projects' effect on wetlands and buffers.

Exhibit 6

Spot Project Effects on Wetlands and Buffers (Acres)

No.	Milepost	Type of Project	Wetland Effects (acres)	100 foot Wetland Buffer Effects (acres)
Segment 1				
4	12.46	IC	0	0
36	3.85 Bickford Ave.	IC	0	0
37	5.04 SR 9	IC	0.41	3.84
49	8.51 88th St	IC	0.18	0.91
50	10.08 Westwick Rd.	IC	0	0.48
51	10.55 Roosevelt Rd.	IC	0	0
			0.59	5.23
Segment 2				
5	14.57 Kelsey St	IC	0	0.15
6	14.92 SR 203	IC	0	0
7	15.15 Ann St./Woods Cr.	IC	0	0
54	15.37	B	0.14	0.99
			0.14	1.14
Segment 3				
9	17.91 Sofie Rd.	IC	0	0.2
10	18.3 153rd Pl. SE	IC	0	0
11	18.98 Nursery	IC	0.2	0.49
12	20.10 – 20.15 Fern Bluff	IC	0	0
16	24.73 Sultan - Startup Rd.	IC	0.57	0.69
17	27.0 Fish Hatchery Rd.	IC	0	0
18	27.45 Nugget Rd.	IC	0	0
20	29.48 Pickle Farm Rd.	R	0	0
21	30.04 Reiter Rd.	IC	0	0
			0.77	1.38
Segment 4				
23	30.6 Green Water	IC	0	0
30	38.5	S	0	0
31	45.9 Money Creek	IC	0	0
33	49.51 Beckler Rd.	IC	0	0
34	49.98 Old Cascade Hwy	IC	0	0
45	35.62 Index Galena Rd.	IC	0	0
47	48.71 5th St. Skykomish	R	0	0
			0	0

Type of Project

IC *Intersection improvement*

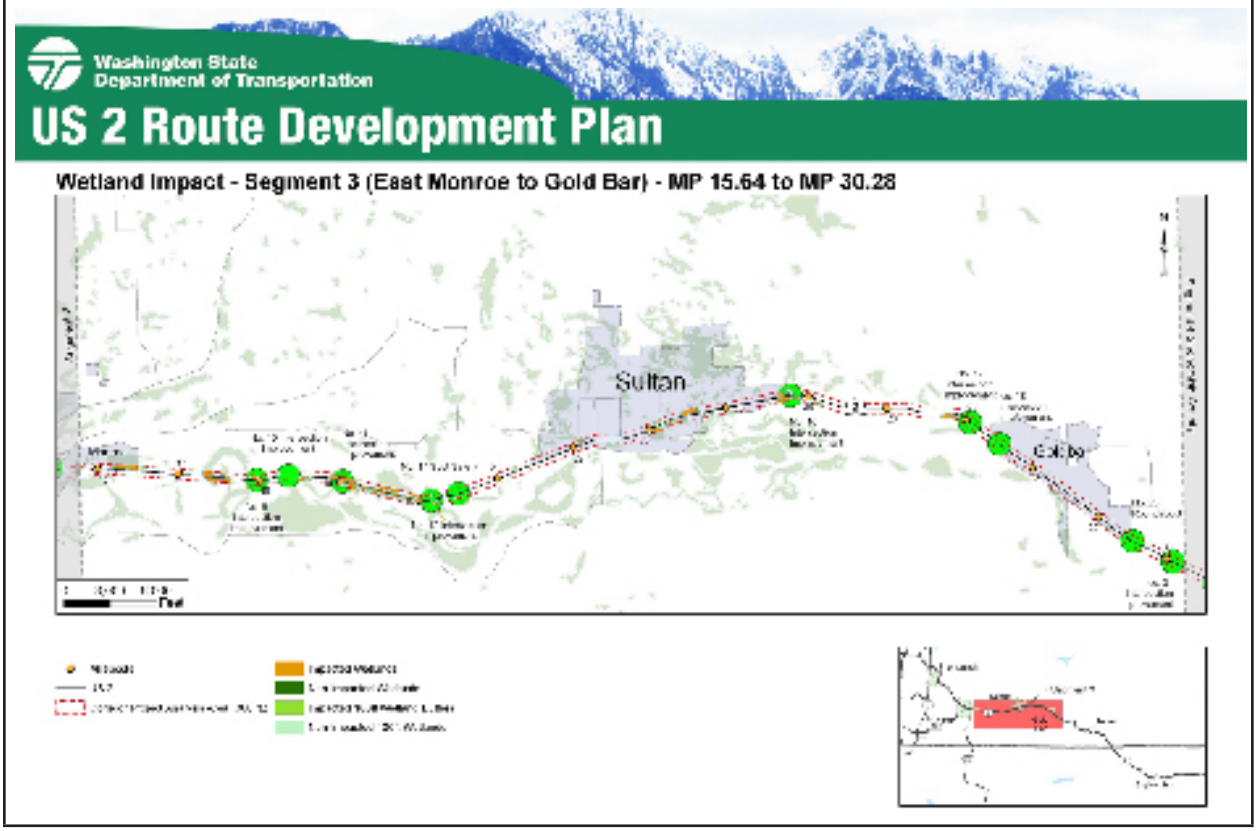
B *Bridge improvement*

S *Safety project*

R *Roundabout*

These results of the spot project analysis show that most of the effects on wetlands and wetland buffers occur in Segment 1. There are no wetland and wetland buffers effects predicted for Segment 4. The projects with the most effects on wetlands and wetland buffers include Project 16 in Segment 3 and Project 37 in Segment 1.

Figure 1
Wetland Impacts: Segment 3 – East Monroe to Gold Bar



Source: National Welands Inventory: Snohomish County; King County

3 Water Quality

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on water quality, specifically groundwater quality and surface water quality.

It is important to protect groundwater from contaminants such as polluted surface water runoff from roads, because groundwater is used as potable water supply in areas along the US 2 corridor. WSDOT evaluated the potential project effects on two types of regulated groundwater resources, including wellhead protection areas and critical aquifer recharge areas (CARAs), which are categorized as aquifer sensitivity areas.

Wellhead protection areas guard groundwater-fed public water systems. A wellhead protection area is defined as the area around a well in which a contaminant could travel to the wellhead within a given time frame, in this case 10 years. Critical aquifer recharge areas protect the need for adequate recharge of aquifers used as sources of potable (drinking) water.

Surface water systems in the analysis area can be affected by additional stormwater runoff created by additional impervious surface areas created by widening the highway. New impervious surface can inhibit the ability of stormwater to infiltrate the local aquifers. Reduced infiltration rates would result in increased stormwater runoff rates and volumes, and increased velocity of flows in downstream systems that can cause erosion of stream banks, scouring of streambeds, and increased flooding risks.

Methods

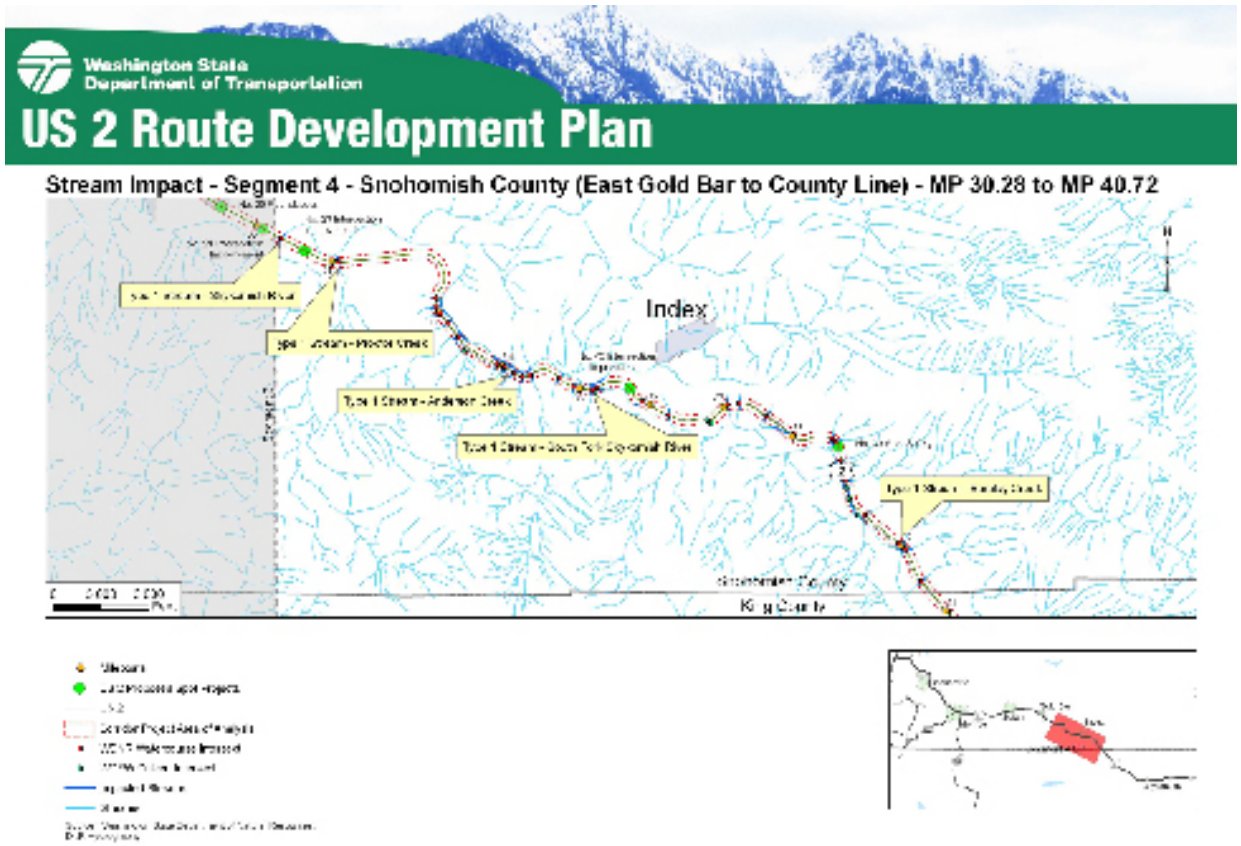
WSDOT used the extended analysis area for studying water quality. This area included the existing roadway and intersections plus 300 feet on each side of the pavement. The analysis area was overlaid on water quality data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for wellhead protection areas, critical area aquifers, and new impervious surface areas. The GIS layers consisted of data from the following sources:

- Wellhead protection area data was collected from the Washington Department of Health
- Critical aquifer recharge area data was provided by Snohomish County, but was originally published by the U.S. Geological Survey, "The Ground-Water System and Ground-Water Quality in Western Snohomish County, Washington" (USGS 1997), and
- New impervious surface areas data was calculated by determining the area of the project footprint. As described in Section 1.0, WSDOT estimated the location of the project footprint and the edge of pavement by centering the average road width of US 2 along the centerline of US 2 on an aerial photograph. This estimated road footprint and edge of pavement was quality checked against landmarks on aerial photographs and other GIS layers. After the quality check, our engineers calculated the existing impervious surface and proposed new impervious surface for each proposed project by calculating the area of each project's polygon.

Result Summary

The results of the corridor projects analysis are summarized in the following tables for CARAs, wellhead protection areas, and impervious surface areas. The location of the water quality is depicted on screening maps, which are provided in **Appendix A**.

Figure 2
Stream Impact: Segment 4 – Snohomish County



Source: Washington State Department of Natural Resources; DNR Hydrography

Exhibit 7

Total Corridor Wide Project Effects on Critical Aquifers Recharge Areas (Acres)

No.	Milepost	Type of Project	Low Sensitivity (acres)	Medium Sensitivity (acres)	High Sensitivity (acres)
Segment 1					
2	3.5 –12.7	SH	33	38	41
48	3.5 – 12.7	W	33	38	41
			65	75	82
Segment 2					
38	12.7 – 15.6	PED	0.51	4	31
52	12.7 – 15.6	A	0.51	4	31
53	12.7 – 15.6	A	0.51	4	31
55	12.7 – 14.57	W	0.51	2	20
56	12.7 - 13.87	W	0.51	2	12
			3	15	125
Segment 3					
13	20.7 – 21.39	PASS	0	0	8
15	22.24 – 22.93	IC	0	0	8
19	28.59 – 28.9	IC	0	0	4
40	21.42 – 24.44	W	0	0	37
41	27.51 – 28.72	W	0	0	15
42	27.51 – 28.72	W	0	0	15
57	15.6 – 30.1	W	0	0	176
58	21.42 – 24.44	W	0	0	37
			0	0	299
Segment 4					
24	31.26 – 31.73	IC	0	0	6
25	32.23 – 32.96	S	0	3	6
26	35.1 – 35.62	B	0	0	6
29	35.95 – 36.4	PASS	0	0	1
32	48.7 - 49.5	PED	0	0	0
35	49.8 – 50.2	IC	0	0	0
43	30.3 – 50.0	SH	0	3	62
44	30.3 – 50.0	B	0	3	62
46	41.0 – 43.0	PASS	0	0	0
			0	10	143

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
PED *Pedestrian improvement*
PASS *Passing Lane*
SH *Shoulder improvements*
W *Widen highway*
S *Safety project*
A *New alignment of highway*

These results of the corridor project analysis show that most aquifer sensitivity areas occur in Segment 3. The project with the most effects on aquifer sensitivity areas appears to be Project 57 in Segment 3.

Exhibit 8
Corridor Project Effects on Wellhead Protection Areas

No.	Type of Project	WPA (acres)
Segment 1		
2	SH	0
48	W	0
		0
Segment 2		
38	PED	0
52	A	0
53	A	0
55	W	0
56	W	0
		0
Segment 3		
13	PASS	0
15	IC	0
19	IC	0
40	W	0
41	W	0
42	W	0
57	W	10
58	W	0
		10
Segment 4		
24	IC	0.51
25	S	0.41
26	B	0
29	PASS	0
32	PED	0.5
35	IC	0
43	SH	24
44	B	24
46	PASS	14
		63

Type of Project

IC	*Intersection improvement*	*B*	*Bridge improvement*
S	*Safety project*	*SH*	*Shoulder improvements*
W	*Widen highway*	*A*	*New alignment of highway*
PED	*Pedestrian improvement*	*PASS*	*Passing Lane*

These results of the corridor project analysis for well head protection areas show that most effects occur in Segment 4. The project with the most effects on well head protection areas appears to be Projects 43 and 44 in Segment 4.

Exhibit 9
Corridor Project Effects on New Impervious Surface Areas

US 2 Project Segment	New Impervious Surface Area (acres)
1 (MP 3.50-12.7)	20.9
2 (MP12.7-15.64)	9.7
3 (MP15.64-30.28)	39.6
4 (MP30.28-50.00)	31.0
Total MP (3.50 – 50.00)	**101.2**

The following data summarizes the spot projects' effect on the following tables for CARAs and wellhead protection areas.

Exhibit 10
Spot Project Effects on CARAs

No.	Milepost	Type of Project	Low Sensitivity (acres)	Medium Sensitivity (acres)	High Sensitivity (acres)
Segment 1					
4	12.46	IC	0	0.08	0.64
36	3.85 Bickford Ave.	IC	9	0.02	0
37	5.04 SR 9	IC	17	17	0
49	8.51 88th St	IC	6	23	6
50	10.08 Westwick Rd.	IC	2	0	0
51	10.55 Roosevelt Rd.	IC	0	0	2
			33.94	39.77	8.4
Segment 2					
5	14.57 Kelsey St	IC	0	0	3
6	14.92 SR 203	IC	0	1	1
7	15.15 Ann St./Woods Cr.	IC	0	0	3
54	15.37	B	0	0	2
			0	1.42	8.84
Segment 3					
9	17.91 Sofie Rd.	IC	0	0	0.46
10	18.3 153rd Pl. SE	IC	0	0	0.87
11	18.98 Nursery	IC	0	0	0.87
12	20.10 – 20.15 Fern Bluff	IC	0	0	2
16	24.73 Sultan - Startup Rd.	IC	0	0	2
17	27.0 Fish Hatchery Rd.	IC	0	0	1
18	27.45 Nugget Rd.	IC	0	0	2
20	29.48 Pickle Farm Rd.	R	0	0	2
21	30.04 Reiter Rd.	IC	0	0	2
			0	0	13.2
Segment 4					
23	30.6 Green Water	IC	0	0	0.87
30	38.5	S	0	0	0
31	45.9 Money Creek	IC	0	0	0
33	49.51 Beckler Rd.	IC	0	0	0
34	49.98 Old Cascade Hwy	IC	0	0	0
45	35.62 Index Galena Rd.	IC	0	0	2
47	48.71 5th St. Skykomish	R	0	0	0
			0	0	3.08

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that most aquifer sensitive areas occur in Segment 3 and Segment 2. The projects with the most effects on aquifer sensitive areas include project 49 and project 37 in Segment 1. Only one spot project has an effect on wellhead protection areas, which is project 23 in Segment 4 (0.45 acres).

Streams

WSDOT evaluated the effects of the proposed projects on streams. The proposed projects will convert pervious surface, such as soil and vegetation, to an impervious surface such as pavement. Increases in impervious surface area can increase stormwater runoff rates and volumes, which can increase the velocity of flows in downstream systems and cause erosion of stream banks, scouring of streambeds, and can increase flooding risks.

Methods (Streams)

WSDOT used the extended analysis area for studying streams. This area included the existing roadway and intersections plus 300 feet on each side of the pavement. The analysis area was overlaid on streams data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for streams by stream type. The state categorizes streams by type, with Class 1 streams being the highest quality streams and therefore the most protected, Class 5 streams being the lowest ranked stream type, and Class 9 being an unclassified stream. The GIS layers consisted of data from Washington State Department of Natural Resources.

Result Summary

The results of the corridor projects are summarized in the following table. The location of the streams is depicted on screening maps, which are provided in **Appendix A**.

Exhibit 11

Total Corridor Project Effects on Streams (linear feet)

No.	Milepost	Type of Project	Type 1 (linear feet)	Type 2 (linear feet)	Type 3 (linear feet)	Type 4 (linear feet)	Type 5 (linear feet)	Type 9 (linear feet)
Segment 1								
2	3.5 –12.7	SH	3,316	1,683	5,568	813	1,550	1,571
48	3.5 – 12.7	W	3,316	1,683	5,568	813	1,550	1,571
			6,632	3,366	11,136	1,626	3,100	3,142
Segment 2								
38	12.7 – 15.6	PED	965	1,648	2,806	1,794	3,998	0
52	12.7 – 15.6	A	0	0	43	0	0	0
53	12.7 – 15.6	A	363	0	0	0	0	40
55	12.7 – 14.57	W	0	1,648	2,806	0	1,794	3,149
56	12.7 - 13.87	W	0	1,648	2,806	0	1,794	3,149
			1,328	4,944	8,461	1,794	7,586	6,338
Segment 3								
13	20.7 – 21.39	PASS	0	0	0	0	0	0
15	22.24 – 22.93	IC	515	0	319	0	619	0
19	28.59 – 28.9	IC	0	0	0	0	0	0
40	21.42 – 24.44	W	2,252	0	3,128	0	0	1,561
41	27.51 – 28.72	W	394	0	0	0	0	619
42	27.51 – 28.72	W	394	0	0	0	0	619
57	15.6 – 30.1	W	6,870	398	6,242	2,865	1,093	5,988
58	21.42 – 24.44	W	2,252	0	3,128	0	0	1,561
			12,677	398	12,817	2,865	1,712	10,348
Segment 4								
24	31.26 – 31.73	IC	0	0	0	0	0	0
25	32.23 – 32.96	S	354	1,828	0	0	0	0
26	35.1 – 35.62	B	1,793	0	0	523	0	0
29	35.95 – 36.4	PASS	0	0	0	0	0	704
32	48.7 - 49.5	PED	0	0	0	0	1,114	1,177
35	49.8 – 50.2	IC	0	0	0	0	0	780
43	30.3 – 50.0	SH	21,783	3,441	4,895	6,417	8,690	13,957
44	30.3 – 50.0	B	21,783	3,441	4,895	6,417	8,690	13,957
46	41.0 – 43.0	PASS	0	0	0	0	0	2,477
			45,713	8,710	9,790	13,357	18,494	33,052

Type of Project

IC	*Intersection improvement*	*B*	*Bridge improvement*
S	*Safety project*	*SH*	*Shoulder improvements*
W	*Widen highway*	*A*	*New alignment of highway*
PED	*Pedestrian improvement*	*PASS*	*Passing Lane*

These results show that most of the effects on streams occur in Segment 4, with Segment 3 close behind, and the other segments have significantly less effects on streams.

The following table summarizes the spot projects' effect on streams.

Exhibit 12
Spot Project Effects on Streams

No.	Milepost	Type of Project	Type 1 (linear feet)	Type 2 (linear feet)	Type 3 (linear feet)	Type 4 (linear feet)	Type 5 (linear feet)	Type 9 (linear feet)
Segment 1								
4	12.46	IC						
36	3.85 Bickford Ave.	IC						
37	5.04 SR 9	IC						
49	8.51 88th St	IC						
50	10.08 Westwick Rd.	IC						
51	10.55 Roosevelt Rd.	IC						
			0	0	0	0	0	0
Segment 2								
5	14.57 Kelsey St	IC						
6	14.92 SR 203	IC						
7	15.15 Ann St./Woods Cr.	IC						
54	15.37	B						
			0	0	0	0	0	0
Segment 3								
9	17.91 Sofie Rd.	IC						
10	18.3 153rd Pl. SE	IC						
11	18.98 Nursery	IC						
12	20.10 – 20.15 Fern Bluff	IC						
16	24.73 Sultan - Startup Rd.	IC						
17	27.0 Fish Hatchery Rd.	IC						
18	27.45 Nugget Rd.	IC						
20	29.48 Pickle Farm Rd.	R						
21	30.04 Reiter Rd.	IC						
			0	0	0	0	0	0
Segment 4								
23	30.6 Green Water	IC						
30	38.5	S						
31	45.9 Money Creek	IC						
33	49.51 Beckler Rd.	IC						
34	49.98 Old Cascade Hwy	IC						313
45	35.62 Index Galena Rd.	IC						
47	48.71 5th St. Skykomish	R						
			0	0	0	0	0	313

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that the only effects on streams are for project 34 in Segment 4, which has 313 linear feet of effects to a Type 9 stream.

4 Fish and Aquatic Resources

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on fish. Numerous protected fish species use the streams within the project area including:

- Chinook salmon,
- Coho salmon,
- chum salmon,
- pink salmon,
- sockeye salmon,
- steelhead / rainbow trout,
- cutthroat trout,
- Dolly Varden / bull trout, and
- largemouth bass.

Fish species that were of concern in this study included endangered, threatened, and candidate species and state priority species. The following exhibit summarizes the status of each of these species.

Exhibit 13
Protected Fish Species in the US 2 Corridor Study Area

Common Name	DPU / ESU[3]	ESA Status		Habitat Status	Source[4]
		Federal	State		
Chinook salmon (fall, spring) Oncorhynchus tshawytscha	Puget Sound	Federal threatened	State priority species or candidate species (food)	Federal - designated; State -any occurrence	WDFW, NOAA
Coho salmon, O. kisutch	Puget Sound	Federal species of concern	Food fish	Federal - NA; State -any occurrence	WDFW, NOAA
Pink salmon, O. gorbuscha	NA	Not warranted	Food fish	Federal - NA; State -any occurrence	WDFW, NOAA
Chum salmon (fall), O. keta	NA	Not warranted	Food fish	Federal - NA; State -any occurrence	WDFW, NOAA
Steelhead/ Rainbow trout (summer, winter), O mykiss	NA	Not warranted	Food fish	Federal – TBD; State -any occurrence	WDFW, NOAA
Cutthroat trout, O. clarki	NA	Not warranted	Game Fish		WDFW, NOAA
Sockeye Salmon, O. nerka	NA	Not warranted	Food fish	Federal - NA; State -any occurrence	WDFW, NOAA
Dolly Varden / Bull Trout, Salvelinus confluentus	ID, MT, NV, OR, WA	Federal threatened	Game Fish	Federal - NA; State - NA	USFW
Largemouth Bass Micropterus Salmoides	NA	Not warranted	Game Fish		WDFW, NOAA

Protected fish species determined to inhabit aquatic resources within the area of analysis would have to be considered during the design of the stormwater system and in the permitting and environmental review process. In addition, protecting fish habitat is essential to the survival of these species. In this section, WSDOT also evaluates how structural improvements to in-stream culverts with existing barriers can affect fish in the analysis area.

3 DPU - Distinct Population Unit, a term used by Fish & Wildlife to denote the location of the species in the country or region. ESU - Evolutionarily Significant Unit, a term used by NOAA to denote the location of the species in the country or region.

4 http://wdfw.wa.gov/wlm/diversty/soc/adv_search.htm, http://wdfw.wa.gov/hab/phsvert.htm#fish, http://www.nmfs.noaa.gov/pr/species/esa.htm#fish, http://www.fws.gov/endangered/wildlife.html, http://www.nwr.noaa.gov/Salmon-Habitat/Critical-Habitat

Methods

WSDOT used the extended analysis area for studying fish and aquatic resources. This area included the existing roadway and intersections plus 300 feet on each side of the pavement. The analysis area was overlaid upon fish data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for fish using two main criteria:

- What type of protected fish species exist near stream crossings where roadway improvements are planned, and
- Where culvert work is anticipated, which will require in-water work, and could cause a temporary disturbance to fish until the improvements are completed.
- How much fish habitat will be affected by the proposed projects.

The GIS layers consisted of data from WDFW for Priority Habitat and Species (PHS) specific to the analysis area. WSDOT also reviewed information on protected species for King and Pierce counties from the National Oceanic and Atmospheric Administration (NOAA) Fisheries and the U.S. Fish and Wildlife Service (USFWS).

WSDOT also mapped the locations of protected fish species in streams and rivers in the project vicinity, along with the locations of existing culverts and bridges requiring repair or replacement. WSDOT also calculated the projects' effects on fish due to potential in-water work by overlaying the following data layers:

- Protected fish species data layers from WDNR and the other data sources listed above.
- Culverts with potential barriers gathered from WDNR.

Culverts with a partial barrier may require modification or replacement. Culverts with a complete barrier are likely to require replacement. Culverts with an unknown status have not yet been evaluated.

Result Summary

The results of the corridor project analysis are summarized in the following table. Fish distribution and the location of culverts are depicted on screening maps, which are provided in **Appendix A**.

Exhibit 14
Types of Fish Found in Corridor Projects' Analysis Areas

No.	Milepost	Type of Project	Chinook	Chum	Coho	Sockeye	Pink	Steel-head	Dolly Varden/ Bull Trout	Large-mouth Bass	Rainbow Trout	Cut-throat Trout	Total Species per Project
Segment 1													
2	3.5 –12.7	SH	x	x	x	x	x	x	x	x		x	9
48	3.5 – 12.7	W	x	x	x	x	x	x	x			x	8
Segment 2													
38	12.7 – 15.6	PED	x	x	x		x	x	x			x	7
52	12.7 – 15.6	A			x								1
53	12.7 – 15.6	A	x	x	x		x	x					5
55	12.7 – 14.57	W			x								1
56	12.7 - 13.87	W			x								1
Segment 3													
13	20.7 – 21.39	PASS											0
15	22.24 – 22.93	IC											0
19	28.59 – 28.9	IC										x	1
40	21.42 – 24.44	W	x	x	x		x	x	x			x	7
41	27.51 – 28.72	W										x	1
42	27.51 – 28.72	W											0
57	15.6 – 30.1	W	x	x	x		x	x	x			x	7
58	21.42 – 24.44	W	x	x	x		x	x	x			x	7
Segment 4													
24	31.26 – 31.73	IC											0
25	32.23 – 32.96	S											0
26	35.1 – 35.62	B	x	x	x		x	x	x			x	7
29	35.95 – 36.4	PASS											0
32	48.7 - 49.5	PED											0
35	49.8 – 50.2	IC											0
43	30.3 – 50.0	SH	x	x	x		x	x	x			x	7
44	30.3 – 50.0	B	x	x	x		x	x	x			x	7
46	41.0 – 43.0	PASS			x								1

Type of Projectt

IC	*Intersection improvement*	*W*	*Widen highway*
B	*Bridge improvement*	*A*	*New alignment of highway*
S	*Safety project*	*PED*	*Pedestrian improvement*
SH	*Shoulder improvements*	*PASS*	*Passing Lane*

The results of the corridor project analysis show that more fish

species are likely to be effected in Segment 1. The projects with the most of the potential effects on fish species include Projects 48 and 2, which could effect between eight and nine types of fish.

Exhibit 15
Corridor Projects Effects on Fish due to Culverts Replacement or Repair

No.	Milepost	Type of Project	Partial Barrier	Total Barrier	Unknown
Segment 1					
2	3.5 –12.7	SH	0	0	1
48	3.5 – 12.7	W	0	0	1
			0	0	2
Segment 2					
38	12.7 – 15.6	PED	1	0	0
52	12.7 – 15.6	A	1.0	0	0
53	12.7 – 15.6	A	1	0	0
55	12.7 – 14.57	W	1	0	0
56	12.7 - 13.87	W	1	0	0
			5	0	0
Segment 3					
13	20.7 – 21.39	PASS	0.0	0.0	0
15	22.24 – 22.93	IC	0.0	0.0	0
19	28.59 – 28.9	IC	0.0	0.0	0
40	21.42 – 24.44	W	4	0	2
41	27.51 – 28.72	W	0.0	0.0	0
42	27.51 – 28.72	W	0.0	0.0	0
57	15.6 – 30.1	W	8	1	11
58	21.42 – 24.44	W	4	0	2
			16	1	15
Segment 4					
24	31.26 – 31.73	IC	0.0	0.0	0
25	32.23 – 32.96	S	0.0	0.0	0
26	35.1 – 35.62	B	1.0	0	0
29	35.95 – 36.4	PASS	0.0	0.0	0
32	48.7 - 49.5	PED	0	4.0	0
35	49.8 – 50.2	IC	0	3.0	0
43	30.3 – 50.0	SH	6	11	5
44	30.3 – 50.0	B	6	11	5
46	41.0 – 43.0	PASS	0	0	0
			13	29	10

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
S *Safety project*
SH *Shoulder improvements*
W *Widen highway*
A *New alignment of highway*
PED *Pedestrian improvement*
PASS *Passing Lane*

The results of the corridor project analysis shows that most of the effects on fish species due to culvert repair or replacement work are likely to occur in Segment 3. The projects with the most effects on fish species due to culvert repair or replacement work appear to be projects 57 in Segment 3 and Projects 43 and 44 in Segment 4.

In–water work related to bridge repair or replacement is also a concern. Segment 4 is expected to have 26 bridge replacements or repair projects.

The results of the spot project analysis show that the only effects on fish species are for Project 54, which crosses a stream that contains eight types of fish, including:

- Cutthroat trout,
- Chinook salmon,
- Chum salmon,
- Coho salmon,
- Dolly Varden bull trout,
- Pink salmon, and
- Summer and winter steelhead runs.

The spot projects have no potential effects to fish specific from culvert repair or replacement.

The following table summarizes the effects of the proposed projects on critical fish habitat.

Exhibit 16
Corridor Project Effects on Fish Habitat

No.	Milepost	Type of Project	Critical Chinook Habitat (linear feet)	Critical Bull Trout Habitat (linear feet)
Segment 1				
2	3.5 –12.7	SH	327	253
48	3.5 – 12.7	W	327	253
			654	506
Segment 2				
38	12.7 – 15.6	PED	102	0
52	12.7 – 15.6	A	0	0
53	12.7 – 15.6	A	363	0
55	12.7 – 14.57	W	0	0
56	12.7 - 13.87	W	0	0
			465	0
Segment 3				
13	20.7 – 21.39	PASS	0	0
15	22.24 – 22.93	IC	0	0
19	28.59 – 28.9	IC	0	0
40	21.42 – 24.44	W	0	101
41	27.51 – 28.72	W	0	0
42	27.51 – 28.72	W	0	0
57	15.6 – 30.1	W	402	435
58	21.42 – 24.44	W	207	101
			609	637
Segment 4				
24	31.26 – 31.73	IC	0	0
25	32.23 – 32.96	S	0	0
26	35.1 – 35.62	B	116	109
29	35.95 – 36.4	PASS	0	0
32	48.7 - 49.5	PED	0	0
35	49.8 – 50.2	IC	0	0
43	30.3 – 50.0	SH	350	353
44	30.3 – 50.0	B	350	353
46	41.0 – 43.0	PASS	0	0
			816	815

Type of Project

IC	*Intersection improvement*	*W*	*Widen highway*
B	*Bridge improvement*	*A*	*New alignment of highway*
S	*Safety project*	*PED*	*Pedestrian improvement*
SH	*Shoulder improvements*	*PASS*	*Passing Lane*

The results of the corridor project analysis show that most of the effects on critical Chinook and bull trout habitat occur in Segment 4. The project with the most effect on critical Chinook and bull trout habitat appear to be Project 57 in Segment 3. The spot projects do not appear to have an effect on critical fish habitat.

5 Wildlife

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on wildlife. Numerous protected species exist within the project area. Wildlife and wildlife habitat are important components of an ecosystem's health and function. The primary types of wildlife that exist in the study area are listed in the following exhibit.

Exhibit 17
Occurrence of Threatened, Endangered, and Other Wildlife of Special Interest in the US 2 Corridor Study Area

Species	State Status	Federal Status	Source of Data
Bald Eagle	Threatened	Threatened	WDFW, USFW
Peregrine Falcon	Priority Species	Species of Concern	WDFW, USFW
Great Blue Heron	Priority Species	None	WDFW
Green Heron	Monitored	None	WDFW
Harlequin Duck	Priority Species	None	WDFW
Mountain Quail	Priority Species	None	WDFW
Osprey	Monitored	None	WDFW
Mountain Goat	Priority Species	None	WDFW

Methods

The occurrences of specific wildlife species in the project vicinity have not been mapped or tabulated in GIS layers. Therefore, the project team has evaluated potential effects on wildlife habitat more generally. WSDOT calculated the amount of wildlife habitat that could be affected by project elements using GIS. WSDOT evaluated two types of wildlife habitat including critical habitat areas, and priority habitat species and wildlife heritage areas.

Critical Habitat Areas

Critical Habitat Areas are specific geographic areas that contain features essential for the conservation of a threatened or endangered species and that may require special management and protection. Critical habitat may include an area that is not currently occupied by the species but that will be needed for its recovery.

Priority Habitat Species and Wildlife Heritage Area

Priority species require protective measures for their perpetuation due to their population status, sensitivity to habitat alteration, and/or recreational, commercial, or tribal importance. Priority species include State Endangered, Threatened, Sensitive, and Candidate species; animal aggregations considered vulnerable; and those species of recreational, commercial, or tribal importance that are vulnerable. Priority habitats are those habitat types or elements with unique or significant value to a diverse assemblage of species. A priority habitat may consist of a unique vegetation type or dominant plant species, a described successional stage, or a specific structural element.

WSDOT used the extended analysis area for studying water quality. This area included the existing roadway and intersections plus 300 feet on each side of the pavement. The analysis area was overlaid on critical habitat areas and priority habitat species and wildlife heritage area data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for wildlife using data from WDFW for Priority Habitat and Species (PHS) specific to the analysis area. WSDOT also reviewed information on protected species from the U.S. Fish and Wildlife Service (USFWS).

Corridor Projects Result Summary

The results of the corridor projects analysis are summarized in this section. Wildlife habitat areas are depicted on screening maps, which are provided in **Appendix A**.

The following exhibit summarizes the corridor projects effects on critical area habitat.

Exhibit 18

Corridor Projects Effects on Critical Area Habitat (acres)

No.	Milepost	Type of Project	Osprey in area	Harlequin Ducks Habitat (acres)	Murrelet Habitat (acres)	Spotted Owl Habitat (acres)	Spotted Owl Active Habitat (acres)	Old Growth Forest (acres)
Segment 1								
2	3.5 –12.7	SH						
48	3.5 – 12.7	W						
Segment 2								
38	12.7 – 15.6	PED						
52	12.7 – 15.6	A						
53	12.7 – 15.6	A						
55	12.7 – 14.57	W						
56	12.7 - 13.87	W						
Segment 3								
13	20.7 – 21.39	PASS						
15	22.24 – 22.93	IC						
19	28.59 – 28.9	IC						
40	21.42 – 24.44	W						
41	27.51 – 28.72	W						
42	27.51 – 28.72	W						
57	15.6 – 30.1	W						
58	21.42 – 24.44	W						
Segment 4								
24	31.26 – 31.73	IC	x					
25	32.23 – 32.96	S	x		6			
26	35.1 – 35.62	B	x					1
29	35.95 – 36.4	PASS	x					
32	48.7 - 49.5	PED	x			19		
35	49.8 – 50.2	IC	x			3		
43	30.3 – 50.0	SH	x	55	26	158	92	2
44	30.3 – 50.0	B	x	55	26	158	92	2
46	41.0 – 43.0	PASS	x				21	
				110	58	339	205	5

Type of Project

IC	*Intersection improvement*	*B*	*Bridge improvement*
S	*Safety project*	*SH*	*Shoulder improvements*
W	*Widen highway*	*A*	*New alignment of highway*
PED	*Pedestrian improvement*	*PASS*	*Passing Lane*

The results of the corridor project analysis show that the only effects on wildlife habitat occur in Segment 4. The projects with the most effect on wildlife habitat appear to be Projects 43 and 44 in Segment 3. These projects may impact osprey and bald eagles as well. There are three osprey nests within Segment 4. In addition, there are 17 bald eagle nests and 6 roosting spots within a mile of the US 2 corridor projects.

The results of the spot project analysis show that the only effects on wildlife habitat are for Project 31 in Segment 4, which has potential effects on harlequin duck habitat and old growth forest. The spot projects are also within a mile of 4 bald eagles nests and 2 roosting areas.

6 Floodplain and Floodway Screening

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on floodplains. Floodplains and related flooding pose dangers to human activities and the built environment, but they also provide many benefits to the environment. Floodplains filter pollution through natural processes, and they act as floodwater storage areas and fish and wildlife habitat.

Floodplains are normally categorized by estimating how often a flood is likely to occur in that part of the floodplain. Floodplains are typically described as 100-year floodplains, 500-year floodplains, or floodways.

Methods

WSDOT used the standard analysis area for studying floodplains and floodways. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid upon floodplain data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for the 100-year floodplains, 500-year floodplains, and floodways. The GIS layers consisted of data from Flood Insurance Rate Maps (FIRM) made by the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP).

Result Summary

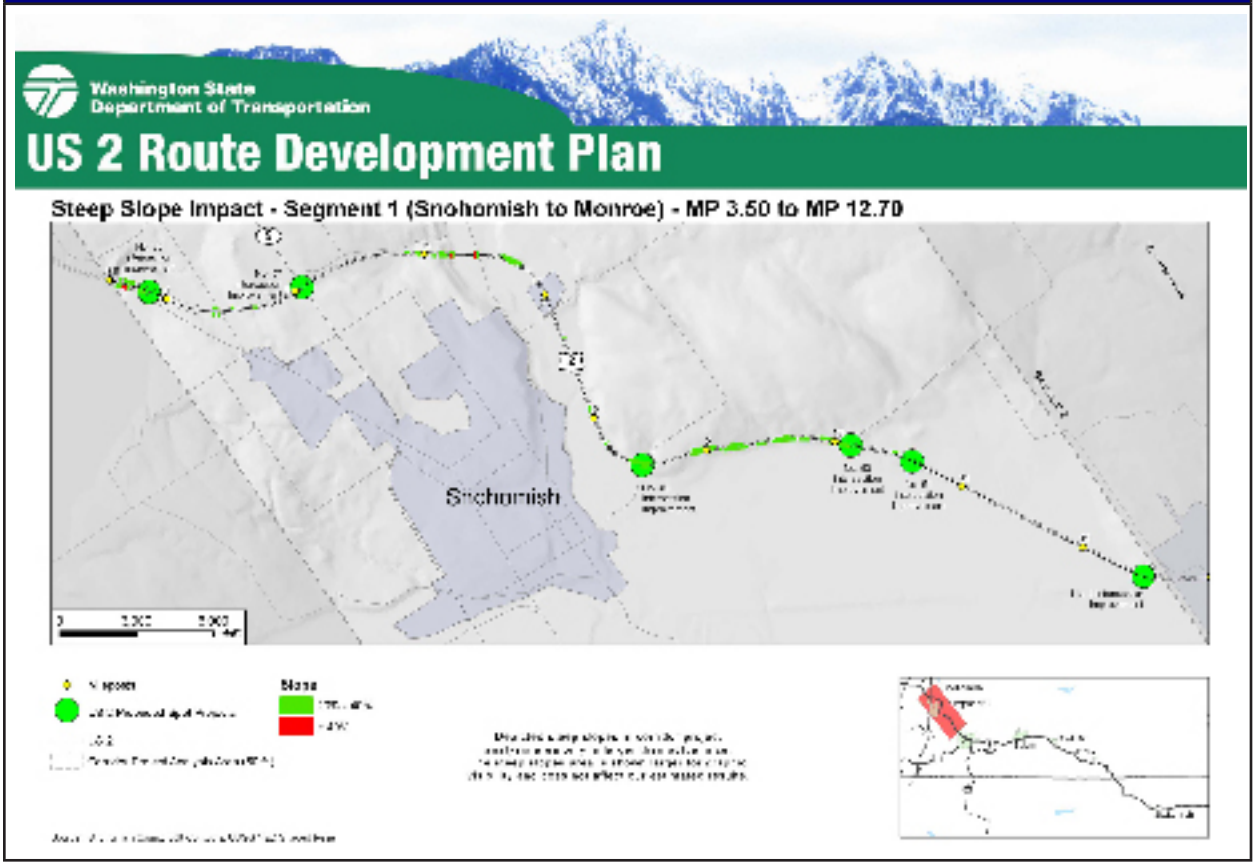
The results of the corridor projects analysis are summarized in the following table. The location of the floodplains and floodways are depicted on screening maps, which are provided in **Appendix A**.

Exhibit 19
Total Corridor Projects Effects on Floodplains (acres)

US 2 Project Segment	100-Year Floodplain	500-Year Floodplain	Floodway
1 (MP 3.50-12.7)	39.70	3.32	0.99
2 (MP12.7-15.64)	4.14	0.52	0.05
3 (MP15.64-30.28)	8.97	6.99	3.60
4 (MP30.28-40.72)	4.63	0.04	1.01
4 (MP40.72-50.00)	2.29	0.67	0.46
Total MP (3.50 – 50.00)	**59.73**	**11.54**	**6.11**

These results show that most of the effects on floodplains and floodways occur in Segment 1, while the other segments have significantly less effects on floodplains.

Figure 3
Floodplain Impact: Segment 1 – Snohomish to Monroe



Source: Federal Emergency Managment Agency (FEMA)

The following table summarizes the spot projects' effect on floodplains and floodways.

Exhibit 20

Spot Project Effects on Floodplains (Acres)

No.	Milepost	Type of Project	100-Year Floodplain (acres)	500-Year Floodplain (acres)	Floodway (acres)
Segment 1					
4	12.46	IC	0.16	0.52	0.00
36	3.85 Bickford Ave.	IC	0.00	0.00	0.00
37	5.04 SR 9	IC	0.00	0.00	0.00
49	8.51 88th St	IC	12.64	0.00	0.00
50	10.08 Westwick Rd.	IC	0.56	0.39	0.00
51	10.55 Roosevelt Rd.	IC	0.00	0.00	0.00
			13.36	0.90	0.00
Segment 2					
5	14.57 Kelsey St	IC	0.00	0.00	0.00
6	14.92 SR 203	IC	0.00	0.00	0.00
7	15.15 Ann St. / Woods Cr.	IC	0.00	0.00	0.00
54	15.37	B	1.02	0.00	0.00
			1.02	0.00	0.00
Segment 3					
9	17.91 Sofie Rd.	IC	0.00	0.00	0.00
10	18.3 153rd Pl. SE	IC	0.00	0.00	0.00
11	18.98 Nursery	IC	0.00	0.00	0.00
12	20.10 – 20.15 Fern Bluff	IC	0.00	0.00	0.00
16	24.73 Sultan - Startup Rd.	IC	0.67	0.00	0.00
17	27.0 Fish Hatchery Rd.	IC	0.16	0.00	0.00
18	27.45 Nugget Rd.	IC	0.01	0.00	0.00
20	29.48 Pickle Farm Rd.	R	0.00	0.00	0.00
21	30.04 Reiter Rd.	IC	0.00	0.00	0.00
			0.84	0.00	0.00
Segment 4					
23	30.6 Green Water	IC	0.00	0.00	0.00
30	38.5	S	0.00	0.00	0.00
31	45.9 Money Creek	IC	0.00	0.00	0.00
33	49.51 Beckler Rd.	IC	0.00	0.00	0.00
34	49.98 Old Cascade Hwy	IC	0.00	0.00	0.00
45	35.62 Index Galena Rd.	IC	0.00	0.00	0.00
47	48.71 5th St. Skykomish	R	0.03	0.00	0.05
			0.03	0.00	0.05

Type of Project

IC Intersection improvement
B Bridge improvement
R Roundabout
S Safety project

The results of the spot project analysis show that the most effects on floodplains are in Segment 1. The project with the most effect on floodplains appears to be Project 49 in Segment 1.

7 Steep Slopes

WSDOT evaluated the effects of the proposed projects on steep slopes that are at high risk of future failure based on various local conditions including soil type, slope gradient and groundwater regime. Slopes that are steeper than 40 percent grade are typically at high risk for landslides.

Methods

WSDOT used the standard analysis area for studying steep slopes. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid upon steep slope data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for the slopes greater than 40 percent grade. The GIS layers consisted of steep slope data from King County and Snohomish County and topographic relief layers from the US Geological Survey.

Result Summary

The results of the corridor projects analysis are summarized in the following table. The location of the steep slopes is depicted on screening maps, which are provided in **Appendix A**.

Exhibit 21
Total Corridor Projects Effects on Steep Slopes (acres)

US 2 Project Segment	Slopes < 40%	Slopes > 40%
1 (MP 3.50-12.7)	8.51	0.13
2 (MP12.7-15.64)	2.46	0.14
3 (MP15.64-30.28)	9.43	0.22
4 (MP30.28-40.72)	22.79	1.28
4 (MP40.72-50.00)	14.04	3.69
Total MP (3.50 – 50.00)	**57.23**	**5.46**

These results show that most of the effects on steep slopes are likely to occur in Segment 4, while the other segments have significantly less effects on steep slopes.

The following table summarizes the spot projects' effect on steep slopes.

Exhibit 22
Spot Project Effects on Steep Slopes (acres)

No.	Milepost	Type of Project	0% - 20% Slope (acres)	20% - 40% Slope (acres)	> 40% Slope (acres)
Segment 1					
4	12.46	IC	0.72	0.00	0.00
36	3.85 Bickford Ave.	IC	7.89	1.01	0.00
37	5.04 SR 9	IC	32.74	0.08	0.00
49	8.51 88th St	IC	26.93	7.27	0.12
50	10.08 Westwick Rd.	IC	1.72	0.49	0.00
51	10.55 Roosevelt Rd.	IC	2.21	0.00	0.00
			72.21	8.86	0.12
Segment 2					
5	14.57 Kelsey St	IC	2.86	0.02	0.00
6	14.92 SR 203	IC	2.87	0.02	0.00
7	15.15 Ann St./Woods Cr.	IC	2.74	0.15	0.00
54	15.37	B	1.62	0.00	0.00
			10.09	0.18	0.00
Segment 3					
9	17.91 Sofie Rd.	IC	0.46	0.00	0.00
10	18.3 153rd Pl. SE	IC	0.19	0.62	0.07
11	18.98 Nursery	IC	0.87	0.00	0.00
12	20.10 – 20.15 Fern Bluff	IC	1.62	0.00	0.00
16	24.73 Sultan - Startup Rd.	IC	1.62	0.00	0.00
17	27.0 Fish Hatchery Rd.	IC	1.13	0.00	0.00
18	27.45 Nugget Rd.	IC	2.21	0.00	0.00
20	29.48 Pickle Farm Rd.	R	2.21	0.00	0.00
21	30.04 Reiter Rd.	IC	2.08	0.13	0.00
			12.39	0.75	0.07
Segment 4					
23	30.6 Green Water	IC	0.87	0.00	0.00
30	38.5	S	0.23	0.55	0.34
31	45.9 Money Creek	IC	1.51	0.40	0.30
33	49.51 Beckler Rd.	IC	1.57	0.05	0.00
34	49.98 Old Cascade Hwy	IC	1.76	0.00	0.00
45	35.62 Index Galena Rd.	IC	1.81	0.40	0.00
47	48.71 5th St. Skykomish	R	1.78	0.41	0.02
			9.53	1.82	0.66

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that Segment 1 most affects steep slopes. The projects with the most effect on steep slopes appear to be Projects 49 and 37 in Segment 1.

8 Liquefaction Screening

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on liquefaction, which occurs when soil takes on the characteristics of a liquid as a result of an increase in soil pore pressure and a reduction in stress. Liquefiable soil is normally solid ground that turns to a jellylike material when disturbed by an earthquake and can cause landslides and massive structural damage. Shallow liquefaction zones can cause severe damage to structures whose foundation support has suddenly become fluid. Lighter structures may float in liquefied soil. Pilings without loads may float upwards. Heavy structures, such as retaining walls and multi-story buildings, may tilt in response to the loss of bearing strength by underlying soil.

Methods

WSDOT used the standard analysis area for studying liquefaction. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid upon liquefaction data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for liquefiable soils based on their potential impact, as classified by Washington State Department of Natural Resources, which can be:

- High
- Moderate to High
- Low
- Very Low to Low
- Very Low

The GIS layers consisted of liquefaction data from the Washington State Department of Natural Resources.

Result Summary

The results of the corridor projects analysis are summarized in the following table. The location of the liquefiable soils is depicted on screening maps, which are provided in **Appendix A**.

Exhibit 23

Total Corridor Projects Effects on Liquefiable Soils (acres)

No.	Milepost	Type of Project	Very Low Susceptibility (acres)	Very Low to Low Susceptibility (acres)	Low Susceptibility (acres)	Moderate to High Susceptibility (acres)	High Susceptibility (acres)	Bedrock (acres)
Segment 1								
2	3.5 –12.7	SH	30.03	32.62	3.65	43.79	1.12	0.00
48	3.5 – 12.7	W	30.03	32.62	3.65	43.79	1.12	0.00
			60.06	65.23	7.29	87.58	2.24	0.00
Segment 2								
38	12.7 – 15.6	PED	3.31	2.03	2.52	27.33	0.00	0.00
52	12.7 – 15.6	A	1.49	0.00	8.85	1.74	0.00	0.00
53	12.7 – 15.6	A	0.00	0.00	4.26	2.69	0.00	0.00
55	12.7 – 14.57	W	0.51	2.03	0.00	20.14	0.00	0.00
56	12.7 - 13.87	W	0.51	2.03	0.00	11.65	0.00	0.00
			5.82	6.09	15.63	63.55	0.00	0.00
Segment 3								
13	20.7 – 21.39	PASS	0.00	0.00	0.00	8.36	0.00	0.00
15	22.24 – 22.93	IC	0.09	0.00	0.00	8.27	0.00	0.00
19	28.59 – 28.9	IC	0.00	0.00	0.00	3.76	0.00	0.00
40	21.42 – 24.44	W	0.98	0.00	17.37	18.52	0.00	0.00
41	27.51 – 28.72	W	0.00	0.00	0.00	14.67	0.00	0.00
42	27.51 – 28.72	W	0.00	0.00	0.00	14.67	0.00	0.00
57	15.6 – 30.1	W	7.84	0.00	19.18	148.79	0.00	0.00
58	21.42 – 24.44	W	0.98	0.00	17.37	18.27	0.00	0.00
			9.89	0.00	53.93	235.32	0.00	0.00
Segment 4								
24	31.26 – 31.73	IC	0.00	0.00	0.00	5.70	0.00	0.00
25	32.23 – 32.96	S	0.00	0.00	5.18	0.58	0.00	3.09
26	35.1 – 35.62	B	0.00	0.00	0.00	6.30	0.00	0.00
29	35.95 – 36.4	PASS	0.00	0.00	0.00	0.00	0.00	5.45
32	48.7 - 49.5	PED	0.00	0.00	0.00	9.70	0.00	0.00
35	49.8 – 50.2	IC	0.00	0.00	0.00	1.45	0.00	0.00
43	30.3 – 50.0	SH	0.00	0.00	10.46	176.47	0.00	50.69
44	30.3 – 50.0	B	0.00	0.00	10.46	176.47	0.00	50.68
46	41.0 – 43.0	PASS	0.00	0.00	0.00	24.24	0.00	0.00
			0.00	0.00	26.10	400.90	0.00	109.92

Type of Project

IC Intersection improvement
SH Shoulder improvements
PED Pedestrian improvement
B Bridge improvement
W Widen highway
PASS Passing Lane
S Safety project
A New alignment of highway

The results of the corridor project analysis show that the most effects on liquefaction susceptible areas occur in Segment 4. The projects with the most effect on steep slopes appear to be Projects 43 and 44 in Segment 4. These areas also have a significant amount of bedrock. Shallow bedrock is conducive to landslides.

The following table summarizes the spot projects' effect on liquefaction.

Exhibit 24

Spot Project Effects on Liquefiable Soils (acres)

No.	Milepost	Type of Projedt	Very Low Susceptibility (acres)	Very Low to Low Susceptibility (acres)	Low Susceptibility (acres)	Moderate to high Susceptibility (acres)	High Susceptibility (acres)	Bedrock (acres)
Segment 1								
4	12.46	IC	0.00	0.08	0.00	0.64	0.00	0.00
36	3.85 Bickford Ave.	IC	8.88	0.03	0.00	0.00	0.00	0.00
37	5.04 SR 9	IC	12.80	20.94	0.00	0.00	0.00	0.00
49	8.51 88th St	IC	4.96	9.15	12.24	7.99	0.00	0.00
50	10.08 Westwick Rd.	IC	2.21	0.00	0.00	0.00	0.00	0.00
51	10.55 Roosevelt Rd.	IC	0.00	0.00	0.00	2.21	0.00	0.00
			28.84	30.19	12.24	10.84	0.00	0.00
Segment 2								
5	14.57 Kelsey St	IC	0.00	0.00	0.00	2.88	0.00	0.00
6	14.92 SR 203	IC	0.00	0.00	1.96	0.92	0.00	0.00
7	15.15 Ann St./ Woods Cr.	IC	0.00	0.00	0.00	2.88	0.00	0.00
54	15.37	B	0.30	0.00	0.00	1.33	0.00	0.00
			0.30	0.00	1.96	8.02	0.00	0.00
Segment 3								
9	17.91 Sofie Rd.	IC	0.00	0.00	0.00	0.46	0.00	0.00
10	18.3 153rd Pl. SE	IC	0.33	0.00	0.00	0.54	0.00	0.00
11	18.98 Nursery	IC	0.00	0.00	0.00	0.87	0.00	0.00
12	20.10 – 20.15 Fern Bluff	IC	0.00	0.00	0.00	1.62	0.00	0.00
16	24.73 Sultan - Startup Rd.	IC	0.00	0.00	0.00	1.62	0.00	0.00
17	27.0 Fish Hatchery Rd.	IC	0.00	0.00	0.00	1.13	0.00	0.00
18	27.45 Nugget Rd.	IC	0.00	0.00	0.00	2.21	0.00	0.00
20	29.48 Pickle Farm Rd.	R	0.00	0.00	0.00	2.21	0.00	0.00
21	30.04 Reiter Rd.	IC	0.00	0.00	0.00	2.21	0.00	0.00
			0.33	0.00	0.00	12.87	0.00	0.00
Segment 4								
23	30.6 Green Water	IC	0.00	0.00	0.00	0.87	0.00	0.00
30	38.5	S	0.00	0.00	0.00	0.00	0.00	1.13
31	45.9 Money Creek	IC	0.00	0.00	0.00	0.26	0.00	1.95
33	49.51 Beckler Rd.	IC	0.00	0.00	0.00	1.62	0.00	0.00
34	49.98 Old Cascade Hwy	IC	0.00	0.00	0.00	1.76	0.00	0.00
45	35.62 Index Galena Rd.	IC	0.00	0.00	0.00	2.21	0.00	0.00
47	48.71 5th St. Skykomish	R	0.00	0.00	0.00	2.20	0.00	0.01
			0.00	0.00	0.00	8.92	0.00	3.09

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that the most effects on liquefaction susceptible areas are in Segment 1. The project with the most effect on liquefaction susceptible areas appears to be Project 49 in Segment 1.

9 Environmental Justice Screening

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on environmental justice. The purpose of this analysis is to ensure that minority and low-income populations do not suffer disproportionate adverse impacts as a result of projects designed for the benefit of the public as a whole and to minimize the hardship of displacement.

To correctly identify potential inequalities, the environmental justice analysis requires preliminary census research and may require more detailed studies of communities and populations in combination with effective community outreach. This process is intended to ensure that projects are developed in a manner that avoids disproportionately high and adverse effects on minority and low-income populations.

Methods

WSDOT reviewed 2000 U.S. Census Bureau data for low-income and minority populations for King and Snohomish Counties and Washington State. The census tracts selected were those that abutted the highway or within the city center areas of cities directly adjacent to the highway. A total of 43 census tracts were analyzed including 42 in Snohomish County and one in King County. When projects are selected and a formal environmental review is conducted at the project level, the environmental justice analysis will be specific to the project site and surrounding community.

The minority population data came from the 1999 Summary File 1, and included P3, Race, Total Population, and P4, Hispanic or Latino, Total Population. The low-income population data were obtained from the 1999 Summary File 3, P87.

The census data shows the quantity of minority and low-income populations, and GIS maps show graphically where these populations are located in the counties.

Result Summary

Effects on Low Income Populations

The U.S. Census Bureau follows the Office of Management and Budget's Statistical Policy Directive 14 to determine poverty status based on income level. Poverty status can be used as a measure of low income for environmental justice analyses. Poverty thresholds do not vary geographically, but do vary according to size of family unit. **Exhibit 25** shows the number and percentage of households below the poverty level in 2000 in King and Snohomish Counties, respectively, including family and non-family households.

The percentage of households with incomes below the poverty level in 1999 in Washington State is 9.8%, while the percentage of households with incomes below the poverty level in 1999 in Snohomish County and King County is 6.9% and 8.4%, respectively.

Along the Corridor there is about a $7,700 spread in average income with unincorporated Snohomish County residents having the highest income at approximately $53,060 and Skykomish residents having an average income of around $45,360.

Seven tracts in analysis area have greater than respective county poverty levels of 6.9% for Snohomish County and 8.4% for King County as shown on the following exhibit.

Exhibit 25
Populations Below State Average Poverty Level (1999)

County	Tract No.	Group No.	Percentage of Households Below Poverty Level
King Co.	32800	3	13.2%
Snohomish Co.	52204	1	7.9%
Snohomish Co.	52205	2	15.6%
Snohomish Co.	52205	3	12.5%
Snohomish Co.	52205	5	31.9%
Snohomish Co.	52401	1	11.9%
Snohomish Co.	52401	4	10.6%
Snohomish Co.	52401	5	7.3%
Snohomish Co.	52402	2	13.3%
Snohomish Co.	52401	3	10.1%
Snohomish Co.	52504	3	9.0%
Snohomish Co.	53801	1	8.4%
Snohomish Co.	53801	4	8.6%
Snohomish Co.	53802	1	7.7%
Snohomish Co.	53803	1	13.7%
Snohomish Co.	53803	2	8.9%
Snohomish Co.	53803	4	11.8%
Snohomish Co.	53803	5	7.5%

The locations of these tracts are depicted on screening maps, which are provided in **Appendix A**.

Effects on Minority Populations

Ethnic groups along the Corridor generally fall within the 5% threshold for non-English speaking populations with the exception of the Hispanic and Latino community in the City of Monroe. Within pockets around the City Center there is a 7.8% Hispanic and Latino population. Sultan has the second highest Latino population at 4%. The remaining cities have a Spanish-speaking population average of 2.6%.

The following is a summary of the population demographics for the analysis area:

Exhibit 26
Populations Below State Average

Population by Race Category	Percent of Population in Analysis Area
White Total	89.00%
Non-White Total	5.74%
Hispanic and Latino	4.92%

The following is a break down of the non-white population:

Exhibit 27
Non-White Population Demographics

Population by Race Category	Percent of Population in Analysis Area
African American	<1%
American Indian	1.3%
Asian	1.2%
Hawaiian	<1%
Other	<1%

The U.S Census Bureau collects data for Hispanic and Latino populations separately from race data to avoid double counting. The non-white population is tallied separately from Hispanic and Latino populations. Non-white populations were calculated by subtracting the "white only" population from total population. Four tracts in Monroe show Hispanic and Latino populations greater than the 7.5% Washington State average including the following tracts:

Exhibit 28
Hispanic and Latino Populations Greater than the State Average

County	Tract No.	Group	Hispanic and Latino Populations Greater than State Average
Snohomish	522.05	2	14.02%
Snohomish	522.05	3	18.25%
Snohomish	522.05	5	24.49%
Snohomish	522.05	6	16.44%

Only one tract shows minority (non-white) population of greater than 18.2% (Washington State data), tract 522.05 in Monroe, which has a non-white population of 23%. The locations of these tracts are depicted on screening maps, which are provided in **Appendix A**.

Effects on Housing and Relocation

No known houses or businesses will be displaced along the US 2 Corridor; however, as implementation of the Route Development Plan occurs, some businesses may experience some short-term construction impacts due detours or restricted access to existing driveways.

Summary

This screening identified high low income populations and Spanish-speaking populations, and determined that there may be the possibility of detours and construction disturbances to residents and businesses. Therefore, early public notification about the proposed projects in both English and Spanish is recommended.

10 Parks and Recreation

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on parks and recreation. The proposed roadway improvement projects are located near a number of public lands such as parks, forest land, recreational areas and wildlife refuges and historic sites. These areas are protected by Section 4(f) of the Department of Transportation Act of 1966 (49 United States Code Section 303), which prohibits the Federal Highway Administration (FHWA) from approving projects that would affect these resources unless there is no feasible and prudent alternative to using the land or the project includes all possible planning to minimize harm to the property.

Methods

WSDOT used the standard analysis area for studying parks and recreation areas. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid on parks and recreation data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for parks and recreation areas. The GIS layers consisted of data from parks and recreation GIS data layers from Snohomish County, King County, and the 2005 Thomas Guide.

Result Summary

The results of the corridor projects analysis are summarized in the following table. The location of the parks and recreation areas are depicted on screening maps, which are provided in **Appendix A**.

Exhibit 29

Corridor Projects Effects on Parks and Recreation Areas

No.	Milepost	Type of Project	Park (acres)	Forest (acres)	Trail (acres)
Segment 1					
2	3.5 –12.7	SH	0.00	0.00	107.00
48	3.5 – 12.7	W	0.00	0.00	107.00
			0.00	0.00	214.00
Segment 2					
38	12.7 – 15.6	PED	0.00	0.00	0.00
52	12.7 – 15.6	A	0.00	0.00	0.00
53	12.7 – 15.6	A	0.00	0.00	0.00
55	12.7 – 14.57	W	0.00	0.00	0.00
56	12.7 - 13.87	W	0.00	0.00	0.00
			0.00	0.00	0.00
Segment 3					
13	20.7 – 21.39	PASS	0.00	0.00	0.00
15	22.24 – 22.93	IC	0.00	0.00	0.00
19	28.59 – 28.9	IC	0.06	0.00	0.00
40	21.42 – 24.44	W	0.31	0.00	0.00
41	27.51 – 28.72	W	1.80	0.00	0.00
42	27.51 – 28.72	W	1.80	0.00	0.00
57	15.6 – 30.1	W	2.20	0.00	0.00
58	21.42 – 24.44	W	0.31	0.00	0.00
			6.47	0.00	0.00
Segment 4					
24	31.26 – 31.73	IC	0.00	2.79	0.00
25	32.23 – 32.96	S	0.00	8.85	0.00
26	35.1 – 35.62	B	0.00	6.30	0.00
29	35.95 – 36.4	PASS	0.00	5.45	0.00
32	48.7 - 49.5	PED	0.00	9.70	0.00
35	49.8 – 50.2	IC	0.00	1.45	0.00
43	30.3 – 50.0	SH	0.00	222.54	0.00
44	30.3 – 50.0	B	0.00	222.54	0.00
46	41.0 – 43.0	PASS	0.00	24.24	0.00
			0.00	503.88	0.00

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
S *Safety project*
SH *Shoulder improvements*
W *Widen highway*
A *New alignment of highway*
PED *Pedestrian improvement*
PASS *Passing Lane*

The results of the corridor project analysis show that the most effects on parks and recreation areas occur in Segment 4. The projects with the most effects on parks and recreation areas appear to be Projects 43 and 44 in Segment 4. The resource area with the most potential effects is the Centennial Trail in Segment 1.

Exhibit 30
Corridor Projects Effects on Parks and Recreation Areas

Park Name	Affected Area (acres)
Sportsman Park	0.83
Railroad Avenue Park	5.39
Mooring Memorial Park	0.15
Sultan River Park	0.11
Centennial Trail	214
Total	**220**

The following table summarizes the spot projects' effect on parks and recreation areas.

Exhibit 31
Spot Project Effects on Parks and Recreation Areas

No.	Milepost	Type of Project	Park (acres)	Forest (acres)	Trail (acres)
Segment 1					
4	12.46	IC	0.00	0.00	0.00
36	3.85 Bickford Ave.	IC	0.00	0.00	0.00
37	5.04 SR 9	IC	0.00	0.00	0.00
49	8.51 88th St	IC	0.00	0.00	0.00
50	10.08 Westwick Rd.	IC	0.00	0.00	0.00
51	10.55 Roosevelt Rd.	IC	0.00	0.00	0.00
			0.00	0.00	0.00
Segment 2					
5	14.57 Kelsey St	IC	0.00	0.00	0.00
6	14.92 SR 203	IC	0.00	0.00	0.00
7	15.15 Ann St./Woods Cr.	IC	0.00	0.00	0.00
54	15.37	B	0.00	0.00	0.00
			0.00	0.00	0.00
Segment 3					
9	17.91 Sofie Rd.	IC	0.00	0.00	0.00
10	18.3 153rd Pl. SE	IC	0.00	0.00	0.00
11	18.98 Nursery	IC	0.00	0.00	0.00
12	20.10 – 20.15 Fern Bluff	IC	0.00	0.00	0.00
16	24.73 Sultan - Startup Rd.	IC	0.00	0.00	0.00
17	27.0 Fish Hatchery Rd.	IC	0.00	0.00	0.00
18	27.45 Nugget Rd.	IC	0.00	0.00	0.00
20	29.48 Pickle Farm Rd.	R	0.00	0.00	0.00
21	30.04 Reiter Rd.	IC	0.00	0.00	0.00
			0.00	0.00	0.00
Segment 4					
23	30.6 Green Water	IC	0.00	0.00	0.00
30	38.5	S	0.00	1.13	0.00
31	45.9 Money Creek	IC	0.00	2.21	0.00
33	49.51 Beckler Rd.	IC	0.00	1.62	0.00
34	49.98 Old Cascade Hwy	IC	0.00	1.76	0.00
45	35.62 Index Galena Rd.	IC	0.00	2.21	0.00
47	48.71 5th St. Skykomish	R	0.00	2.21	0.00
			0.00	11.13	0.00

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that the most effects on parks and recreation areas are in Segment 4. The projects with the most effects on parks and recreation areas appear to be Projects 31, 45, and 47 in Segment 4.

11 Cultural and Historic Resources

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on cultural and historic resources. There are a number of important historical, archeological, and cultural places within the vicinity of the proposed projects that should be protected by Section 106 of the National Historic Preservation Act either as a property that is registered with or is eligible for registering with the National Registry of Historic Places (NRHP).

The NRHP eligible properties possess a quality of significance in American history, architecture, archaeology, and culture. This is possible in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, material, workmanship, feeling, and association. In addition, properties determined eligible for listing:

a. Are associated with events that have made a significant contribution to the broad patterns of our history; or
b. Are associated with the lives of persons significant in our past; or
c. Embody the distinctive characteristics of a type, period, or method of construction or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
d. Has yielded, or may be likely to yield, information important in prehistory or history (36 CFR Part 60), such as archaeological sites.

Buildings less than 50 years old do not meet the NRHP criteria unless they are of exceptional importance, as described in the National Park Service Bulletin No. 22, "How to Evaluate and Nominate Potential National Register Properties That Have Achieved Significance Within the Last 50 Years."

Methods

The analysis area for cultural and historic places included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid on cultural and historic places data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process

described in Section 1.0, WSDOT calculated the affected area for the cultural and historic places. The data layers were developed from data collected from the Department of Archaeology and Historic Preservation (DAHP) in Olympia, Washington to identify sites along the US 2 study area that have been designated as historic landmarks.

Result Summary

Official state records have deemed three sites to have historical significance in the analysis area, which are listed in the following exhibit. No known archeological sites were identified in the US 2 study area.

Exhibit 32
Total Corridor Wide Project Effect on Cultural and Historic Places

US 2 Project Segment	Site Name	Jurisdiction	Notes
1 (MP 3.50-12.7)	Victor Iverson Home	City of Snohomish	Constructed in 1906
2 (MP12.7-15.64)	None		
3 (MP15.64-30.28)	None		
4 (MP30.28-40.72)			
4 (MP40.72-50.00)	Rail Avenue Historic District	City of Skykomish	
	Maloney's General Store	Railroad Avenue West, Rail Avenue Historic District, City of Skykomish,	Constructed in 1893
	Great Northern Depot	Railroad Avenue and 4th Street, Rail Avenue Historic District, City of Skykomish	Constructed in 1894
	Bridge from US 2	Skykomish	Constructed in 1939

12 Air Quality

The analysis area for air quality included the existing roadway, proposed new lanes, and existing and proposed intersections. The analysis area was overlaid upon air quality data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1, WSDOT calculated the affected area for air quality. The GIS layers consisted of ozone maintenance area and carbon monoxide maintenance area data layers from Washington Department of Transportation and Washington Department of Ecology.

Corridor Wide Results Summary

The roadway improvements would have an overall effect of improving traffic flow and reducing idling time. Because the projects would add capacity to US 2, air quality in the project area is projected to improve when compared to the alternative of not making any improvements to the highway.

Localized air quality effects may still occur in areas where heavy traffic congestion occurs, causing vehicles to slow down or even stop for short time periods. When heavy congestion occurs, more pollutants are emitted from vehicles on project roadways. Under certain meteorological conditions, such as a temperature inversion, the pollutants can build up to unhealthy concentrations and may exceed the ambient air quality standards.

Intersection Results Summary

WSDOT conducted a separate analysis of the intersection improvements in order to prioritize the construction of these projects, which could begin independently of the widening of the highway. There are five new intersections proposed in the corridor, 2 each in Segments 1 and 2 and one new intersection in Segment 3. These new intersections may cause local air quality effects, as described in the previous section.

13 Noise Quality

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on noise quality. Environmental noise may interfere with a broad range of human activities in a way that degrades public health and welfare. Examples include when noise adversely affects a person's hearing, mental state (e.g., causing annoyance), or the ability to engage in important activities such as sleeping or communicating. Traffic and construction noise analyses are required by law for federally funded projects, and by state of Washington policy for other funded projects that:

- Involve construction of a new highway,
- Substantially change the horizontal or vertical alignment, or
- Increase the number of through traffic lanes on an existing highway.

State policy also requires the review and consideration of noise abatement on projects that substantially alter the topography surrounding a state highway.

Methods

WSDOT used the standard analysis area for studying noise quality. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid upon noise quality sensitive receptor data layers to calculate the areas of potential effect. Sensitive receptors are parcels within residential zoning or with nursing homes, medical and health services, churches, libraries, cultural activities centers, and school land use codes.

Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for noise quality. The GIS zoning data layers consisted of data from each local jurisdiction.

Results Summary

WSDOT analyzed Sensitive Noise Receptors by tax parcel, and by their distance from the road because noise decreases with distance. The following exhibit summarizes the potential corridor projects effects on sensitive noise receptors within the

analysis area and outside the analysis area. The noise quality data is depicted on screening maps, which are provided in **Appendix A**.

Exhibit 33
Corridor Project Effects on Noise (Parcels)

No.	Milepost	Type of Project	Number of Parcels Effected	Total Number Tax Parcels in Analysis Area	Percentage of Parcels Effected
Segment 1					
2	3.5 –12.7	SH	175	284	62%
48	3.5 – 12.7	W	175	284	62%
			350	568	62%
Segment 2					
38	12.7 – 15.6	PED	15	184	8%
52	12.7 – 15.6	A	0	4	0%
53	12.7 – 15.6	A	1	12	8%
55	12.7 – 14.57	W	15	86	17%
56	12.7 - 13.87	W	7	53	13%
			38	339	11%
Segment 3					
13	20.7 – 21.39	PASS	7	23	30%
15	22.24 – 22.93	IC	49	171	29%
19	28.59 – 28.9	IC	21	42	50%
40	21.42 – 24.44	W	103	358	29%
41	27.51 – 28.72	W	60	155	39%
42	27.51 – 28.72	W	60	155	39%
57	15.6 – 30.1	W	370	964	38%
58	21.42 – 24.44	W	103	356	29%
			773	2224	35%
Segment 4					
24	31.26 – 31.73	IC	0	27	0%
25	32.23 – 32.96	S	0	20	0%
26	35.1 – 35.62	B	0	32	0%
29	35.95 – 36.4	PASS	0	14	0%
32	48.7 - 49.5	PED	45	51	88%
35	49.8 – 50.2	IC	7	12	58%
43	30.3 – 50.0	SH	338	680	50%
44	30.3 – 50.0	B	338	680	50%
46	41.0 – 43.0	PASS	142	158	90%
			870	1674	52%

Type of Project

IC *Intersection improvement*
S *Safety project*
W *Widen highway*
PED *Pedestrian improvement*
B *Bridge improvement*
SH *Shoulder improvements*
A *New alignment of highway*
PASS *Passing Lane*

The following table summarizes the spot projects' effect on noise quality.

Exhibit 34
Spot Project Effects on Noise Quality (Parcels)

No.	Milepost	Type of Project	Number of Parcels Effected	Total Number Tax Parcels in Analysis Area	Percentage of Parcels Effected
Segment 1					
4	12.46	IC	2	3	67%
36	3.85 Bickford Ave.	IC	0	0	0%
37	5.04 SR 9	IC	0	0	0%
49	8.51 88th St	IC	4	5	80%
50	10.08 Westwick Rd.	IC	1	3	33%
51	10.55 Roosevelt Rd.	IC	3	4	75%
			10	15	67%
Segment 2					
5	14.57 Kelsey St	IC	0	6	0%
6	14.92 SR 203	IC	0	4	0%
7	15.15 Ann St./Woods Cr.	IC	0	7	0%
54	15.37	B	0	6	0%
			0	23	0%
Segment 3					
9	17.91 Sofie Rd.	IC	0	1	0%
10	18.3 153rd Pl. SE	IC	1	1	100%
11	18.98 Nursery	IC	0	2	0%
12	20.10 – 20.15 Fern Bluff	IC	0	2	0%
16	24.73 Sultan - Startup Rd.	IC	1	2	50%
17	27.0 Fish Hatchery Rd.	IC	2	2	100%
18	27.45 Nugget Rd.	IC	2	3	67%
20	29.48 Pickle Farm Rd.	R	0	6	0%
21	30.04 Reiter Rd.	IC	2	3	67%
			8	22	36%
Segment 4					
23	30.6 Green Water	IC	0	6	0%
30	38.5	S	0	1	0%
31	45.9 Money Creek	IC	7	7	100%
33	49.51 Beckler Rd.	IC	3	7	43%
34	49.98 Old Cascade Hwy	IC	4	8	50%
45	35.62 Index Galena Rd.	IC	0	4	0%
47	48.71 5th St. Skykomish	R	3	7	43%
			17	40	43%

Type of Project

IC *Intersection improvement*
R *Roundabout*
B *Bridge improvement*
S *Safety project*

These results of the spot project analysis show that most of the effects on noise quality occur in Segment 1, then Segments 4 and 3. There are no noise effects predicted for Segment 2. The projects with the most effects on noise include projects 10, 17, and 31.

14 Land Use[5]

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on land use. Development projects often either need to acquire land for a project that requires re-zoning or change adjacent land uses significantly enough that it may have a long term zoning affect on neighboring properties. It is important to ensure that projects are consistent with local land use plans and policies. Proposed projects that are determined to be inconsistent with local land use plans and projects may not efficiently receive permits or licenses necessary for project completion.

Methods

WSDOT used the standard analysis area for studying land use. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid upon land use zoning data layers to calculate the areas of potential effect. The GIS layers consisted of data from zoning data layers from each local jurisdiction. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area. If a project needed to use at least half of an adjacent property, the entire parcel would be purchased and the land use of the entire parcel would change.

The results of the corridor project analysis are summarized in the following table. Land use types are depicted on screening maps, which are provided in **Appendix A**.

5 Land-use discussed on pages 67 - 70 may be further impacted by environmental mitigation.

Exhibit 35
Corridor Projects Effects on Land Use (acres)

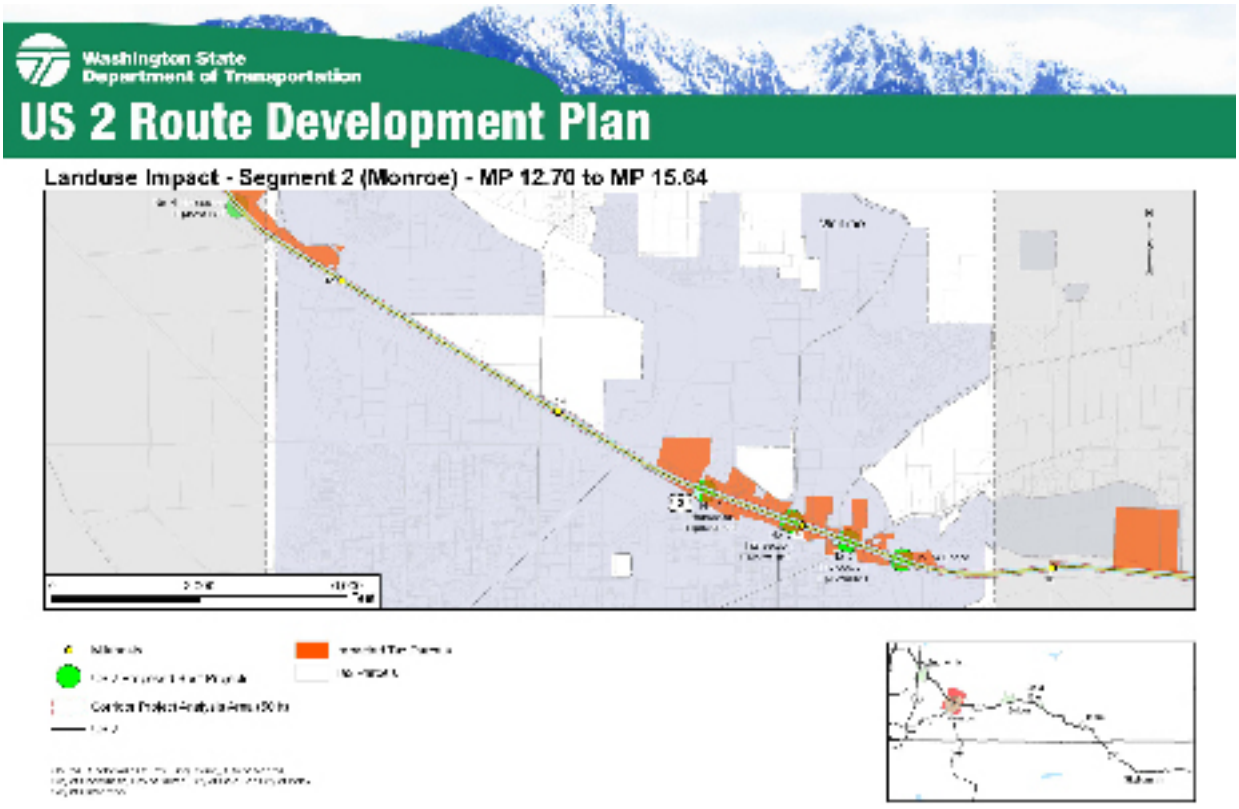
No.	Milepost	Type of Project	Residential (acres)	Commercial (acres)	Vacant (acres)	Resource (acres)
Segment 1						
2	3.5 –12.7	SH	0.01	0.00	0.00	0.00
48	3.5 – 12.7	W	0.01	0.00	0.00	0.00
			0.03	0.00	0.00	0.00
Segment 2						
38	12.7 – 15.6	PED	0.00	0.08	0.00	0.00
52	12.7 – 15.6	A	0.00	0.00	0.00	0.00
53	12.7 – 15.6	A	0.00	3.19	0.00	0.00
55	12.7 – 14.57	W	0.00	0.08	0.00	0.00
56	12.7 - 13.87	W	0.00	0.00	0.00	0.00
			0.00	3.34	0.00	0.00
Segment 3						
13	20.7 – 21.39	PASS	0.00	0.00	0.00	0.00
15	22.24 – 22.93	IC	0.00	0.49	0.00	0.00
19	28.59 – 28.9	IC	0.00	0.00	0.00	0.00
40	21.42 – 24.44	W	0.06	0.70	0.01	0.14
41	27.51 – 28.72	W	0.00	0.71	1.50	0.00
42	27.51 – 28.72	W	0.00	0.71	1.50	0.00
57	15.6 – 30.1	W	0.16	1.52	1.51	0.14
58	21.42 – 24.44	W	0.06	0.70	0.01	0.14
			0.27	4.82	4.52	0.41
Segment 4						
24	31.26 – 31.73	IC	0.00	0.00	0.00	0.00
25	32.23 – 32.96	S	0.00	0.00	0.00	0.00
26	35.1 – 35.62	B	0.00	0.00	0.00	0.00
29	35.95 – 36.4	PASS	0.00	0.00	0.00	0.00
32	48.7 - 49.5	PED	0.44	0.00	5.37	0.00
35	49.8 – 50.2	IC	0.00	0.00	0.00	0.00
43	30.3 – 50.0	SH	8.34	0.00	26.57	1.71
44	30.3 – 50.0	B	8.34	0.00	26.57	1.71
46	41.0 – 43.0	PASS	0.00	0.00	5.20	0.00
			17.12	0.00	63.71	3.43

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
S *Safety project*
SH *Shoulder improvements*
W *Widen highway*
A *New alignment of highway*
PED *Pedestrian improvement*
PASS *Passing Lane*

The results of the corridor project analysis show that most of the effects on land use occur in Segment 4. The projects with the most effects on land use appear to be Projects 43 and 44.

Figure 4
Land Use Impact: Segment 2 – Monroe



Source: Snohomish County, King County, City of Monroe, City of Snohomish, City of Sultan, City of Gold Bar, City of Index, City of Skykomish.

The results of the spot project analysis are summarized in the following table.

Exhibit 36

Spot Projects Effects on Land Use (acres)

No.	Milepost	Type of Project	Residential (acres)	Commercial (acres)	Vacant (acres)	Resource (acres)
Segment 1						
4	12.46	IC	0.00	0.00	0.00	0.00
36	3.85 Bickford Ave.	IC	0.00	0.00	0.00	0.00
37	5.04 SR 9	IC	0.00	0.00	0.00	0.00
49	8.51 88th St	IC	0.00	0.00	0.00	0.00
50	10.08 Westwick Rd.	IC	0.00	0.00	0.00	0.00
51	10.55 Roosevelt Rd.	IC	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00
Segment 2						
5	14.57 Kelsey St	IC	0.00	0.34	0.00	0.00
6	14.92 SR 203	IC	0.00	0.00	0.00	0.00
7	15.15 Ann St./Woods Cr.	IC	0.00	0.33	0.00	0.00
54	15.37	B	0.00	0.00	0.00	0.00
			0.00	0.67	0.00	0.00
Segment 3						
9	17.91 Sofie Rd.	IC	0.00	0.00	0.00	0.00
10	18.3 153rd Pl. SE	IC	0.00	0.00	0.00	0.00
11	18.98 Nursery	IC	0.00	0.00	0.00	0.00
12	20.10 – 20.15 Fern Bluff	IC	0.00	0.00	0.00	0.00
16	24.73 Sultan - Startup Rd.	IC	0.00	0.00	0.00	0.00
17	27.0 Fish Hatchery Rd.	IC	0.00	0.00	0.00	0.00
18	27.45 Nugget Rd.	IC	0.00	0.00	0.00	0.00
20	29.48 Pickle Farm Rd.	R	0.00	0.34	0.00	0.00
21	30.04 Reiter Rd.	IC	0.00	0.00	0.00	0.00
			0.00	0.34	0.00	0.00
Segment 4						
23	30.6 Green Water	IC	0.00	0.00	0.00	0.00
30	38.5	S	0.00	0.00	0.00	0.00
31	45.9 Money Creek	IC	0.00	0.00	0.00	0.00
33	49.51 Beckler Rd.	IC	0.00	0.00	0.00	0.00
34	49.98 Old Cascade Hwy	IC	0.00	0.00	0.00	0.00
45	35.62 Index Galena Rd.	IC	0.00	0.00	0.00	0.00
47	48.71 5th St. Skykomish	R	0.00	0.00	0.00	0.00
			0.00	0.00	0.00	0.00

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that most of the effects on land use occur in Segment 2. The only spot projects with effects on land use include Projects 5, 7, and 20.

15 Public Services[6]

In this part of the environmental screening process, WSDOT evaluated the effects of the proposed projects on public services. It is important that during construction and post construction, the proposed projects do not interfere with access to emergency services, public facilities, and public buildings.

Methods

WSDOT used the standard analysis area for studying public services. This area included the existing roadway and intersections plus 50 feet on each side of the pavement. The analysis area was overlaid upon public services data layers to calculate the areas of potential effect. Using the Model Builder GIS analysis process described in Section 1.0, WSDOT calculated the affected area for public services.

The GIS layers consisted of the following data layers Snohomish County and King County sewer maps, Snohomish County right of way, King County tax parcels, WSDOT railroad, Snohomish County Public Service Building and Facilities, and King County fire station, hospitals, public health clinics, school sites, and county building facilities.

Result Summary

The results of the corridor projects analysis are summarized in the following table. The location of the public services is depicted on screening maps, which are provided in **Appendix A**.

6 Railroad impacts and/or right-of-way requirements may significantly affect the feasibility of the projects described on pages 71 - 75.

Exhibit 37

Corridor Projects Effects on Public Services

No.	Milepost		Number of Fire Stations	Number of Schools	Number of Police Stations	Number of Transportation Related Services	Number of Public Service Buildings	Railroad and Railroad ROW Effected (acres)	Sewer Effected (linear feet)
Segment 1									
2	3.5 –12.7	SH	0.00	0.00	0.00	0.00	0.00	0.91	0.00
48	3.5 – 12.7	W	0.00	0.00	0.00	0.00	0.00	0.91	0.00
			0.00	0.00	0.00	0.00	0.00	0.00	0.00
Segment 2									
38	12.7 – 15.6	PED	0.00	0.00	0.00	1.00	0.00	16.75	7,967
52	12.7 – 15.6	A	0.00	0.00	0.00	0.00	0.00	0.00	35
53	12.7 – 15.6	A	0.00	0.00	0.00	0.00	0.00	0.62	0
55	12.7 – 14.57	W	0.00	0.00	0.00	0.00	0.00	15.10	2,348
56	12.7 - 13.87	W	0.00	0.00	0.00	0.00	0.00	9.76	633
			0.00	0.00	0.00	1.00	0.00	42.23	10,983
Segment 3									
13	20.7 – 21.39	PASS	0.00	0.00	0.00	0.00	0.00	6.45	106
15	22.24 – 22.93	IC	0.00	1.00	1.00	1.00	2.00	3.86	884
19	28.59 – 28.9	IC	0.00	0.00	0.00	0.00	0.00	10.97	0
40	21.42 – 24.44	W	0.00	1.00	1.00	1.00	2.00	5.13	2,683
41	27.51 – 28.72	W	0.00	0.00	0.00	1.00	0.00	5.13	0
42	27.51 – 28.72	W	0.00	0.00	0.00	1.00	0.00	0.00	0
57	15.6 – 30.1	W	1.00	1.00	1.00	2.00	3.00	63.55	2,789
58	21.42 – 24.44	W	0.00	1.00	1.00	1.00	2.00	10.79	2,683
			1.00	4.00	4.00	7.00	9.00	105.88	9,145
Segment 4									
24	31.26 – 31.73	IC	0.00	0.00	0.00	0.00	0.00	3.78	0.00
25	32.23 – 32.96	S	0.00	0.00	0.00	0.00	0.00	3.20	0.00
26	35.1 – 35.62	B	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	35.95 – 36.4	PASS	0.00	0.00	0.00	0.00	0.00	0.57	0.00
32	48.7 - 49.5	PED	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	49.8 – 50.2	IC	0.00	0.00	0.00	0.00	0.00	1.12	0.00
43	30.3 – 50.0	SH	0.00	0.00	0.00	0.00	0.00	79.88	0.00
44	30.3 – 50.0	B	0.00	0.00	0.00	0.00	0.00	79.88	0.00
46	41.0 – 43.0	PASS	0.00	0.00	0.00	0.00	0.00	15.29	0.00
			0.00	0.00	0.00	0.00	0.00	0.00	0.00

Type of Project

IC *Intersection improvement*
** Transportation services include park and ride facilities and vehicle registration offices.*

B *Bridge improvement*
** Public service buildings include post offices, libraries, and county buildings.*

S *Safety project*
W *Widen highway*
PED *Pedestrian improvement*
SH *Shoulder improvements*
A *New alignment of highway*
PASS *Passing Lane*

The results of the corridor project analysis show that most of the effects on public services and facilities occur in Segment 3. The corridor projects may potentially affect fire stations, schools, police stations, park and rides, vehicle registration facilities, libraries and post offices, railroad right of way and sewer systems. The corridor project with the most potential effects on public services and facilities is Project 57 in Segment 3.

Project 57 is likely to affect a fire station and two transportation related facilities, three public buildings, 63 acres of railroad right of way and 2,789 feet of sewer. Projects 43 and 44 are expected to affect about 80 acres of railroad right of way. Project 38 is expected to effect 7,967 linear feet of sewer.

The results of the spot projects analysis are summarized in the following table.

Exhibit 38

Spot Projects Effects on Public Services

No.	Milepost	Type of Project	Railroad and Railroad ROW Effected (acres)	Sewer Effected (linear feet)
Segment 1				
4	12.46	IC	0.00	0.00
36	3.85 Bickford Ave.	IC	0.00	0.00
37	5.04 SR 9	IC	0.00	0.00
49	8.51 88th St	IC	0.00	0.00
50	10.08 Westwick Rd.	IC	0.00	0.00
51	10.55 Roosevelt Rd.	IC	0.00	0.00
			0.00	0.00
Segment 2				
5	14.57 Kelsey St	IC	0.00	806.17
6	14.92 SR 203	IC	0.00	708.08
7	15.15 Ann St./Woods Cr.	IC	0.00	778.86
54	15.37	B	0.00	0.00
			0.00	2293.11
Segment 3				
9	17.91 Sofie Rd.	IC	0.01	0.00
10	18.3 153rd Pl. SE	IC	0.16	0.00
11	18.98 Nursery	IC	0.00	0.00
12	20.10 – 20.15 Fern Bluff	IC	0.58	0.00
16	24.73 Sultan - Startup Rd.	IC	0.00	0.00
17	27.0 Fish Hatchery Rd.	IC	0.40	0.00
18	27.45 Nugget Rd.	IC	0.62	0.00
20	29.48 Pickle Farm Rd.	R	0.00	0.00
21	30.04 Reiter Rd.	IC	0.00	0.00
			1.77	0.00
Segment 4				
23	30.6 Green Water	IC	0.00	0.00
30	38.5	S	0.02	0.00
31	45.9 Money Creek	IC	0.00	0.00
33	49.51 Beckler Rd.	IC	0.00	0.00
34	49.98 Old Cascade Hwy	IC	0.55	0.00
45	35.62 Index Galena Rd.	IC	0.00	0.00
47	48.71 5th St. Skykomish	R	0.00	0.00
			0.57	0.00

Type of Project

IC *Intersection improvement*
B *Bridge improvement*
R *Roundabout*
S *Safety project*

The results of the spot project analysis show that most of the effects on railroad track or railroad right of way occur in Segment 3, primarily due to Projects 18, 12 and 17. The results of the spot project analysis also show that most of the effects on the sewer system occur in Segment 2, primarily due to Projects 5, 6, and 7.

16 Summary of Results

The environmental screening analysis showed that there are corridor and spot project effects for nearly every environmental issue analyzed, as summarized on the following exhibit.

Exhibit 39
Summary of Effects

Impacts	Spot Projects	Corridor Projects
CARA		
10 yr. Wellhead Protection Area	x	x
USGS Sensitivity (CARA)	x	x
Fish		
Fish Distribution	x	x
Bull Trout Critical habitat		x
Chinook Critical Habitat	x	x
Floodplain		
Floodplain	x	x
Land use		
Land use (Zoning)	x	x
Liquefaction		
Liquefaction	x	x
Noise		
Noise	x	x
Parks and rec.		
Parks, Cemetery, Forest	x	x
Trails		x
Essential Public Facilities		
Public Facilities		x
Railroad ROW	x	x
Sewer	x	x
Steep Slopes		
Steep Slopes	x	x
Streams		
Culvert		x
WADNR Stream Type	x	x
Wetland		
Wetland	x	x
100 Wetland Buffer	x	x
Wildlife		
Wildlife heritage		x
PHS	x	x
One Mile Eagle Roost Buffer	x	x
Critical Habitat		x
Old Growth	x	x